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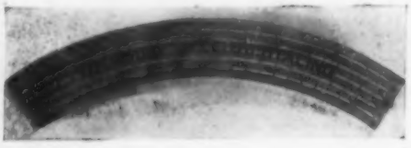

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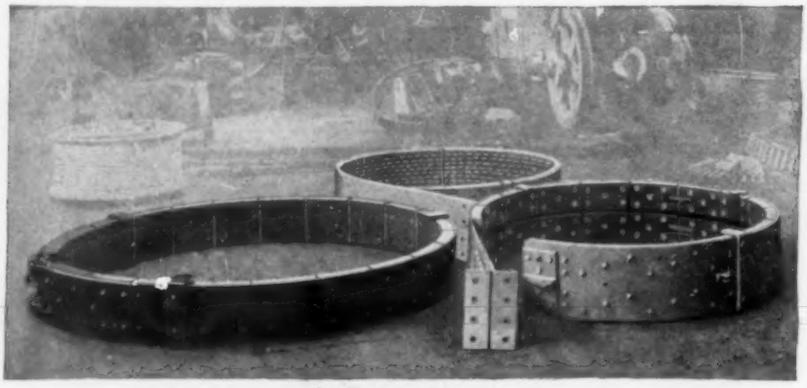

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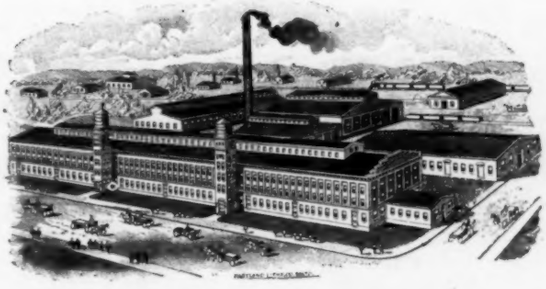

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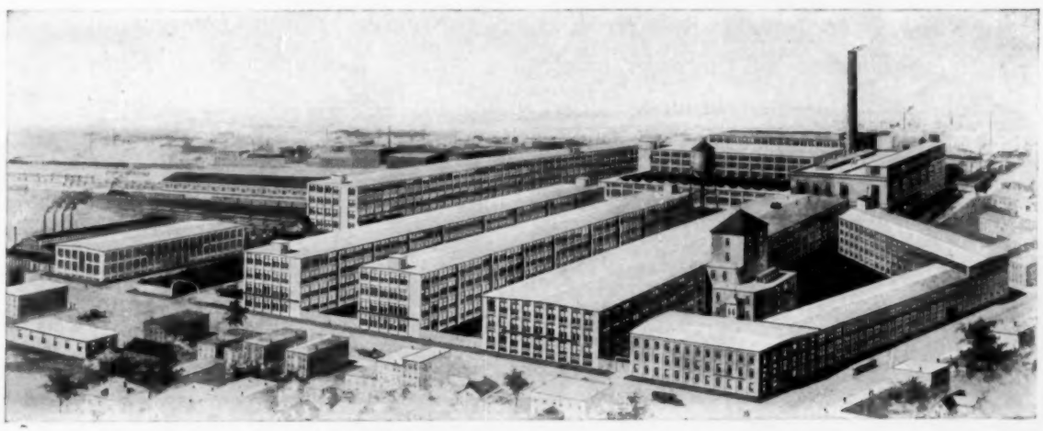

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THE
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The Philippines as a Rubber Producing Country

By William M. Milner

The United States, the world's largest consumer of crude rubber, draws practically all of its supplies of this commodity from lands ruled by foreign powers. It undoubtedly would be of advantage to our rubber industry were at least a fair percentage of its requirements in crude rubber produced upon American territory.

Much has been written of the possibility of growing rubber producing plants within the borders of the United States proper, but it is not probable that such an undertaking would be successful in face of Far Eastern plantation competition, and it is wiser to look to our tropical possessions where the best rubber yielding plants thrive.

RUBBER VINES GROWING IN PHILIPPINE FORESTS

Rubber is being produced in small quantities in the Philippines from both wild and cultivated plants, and much more could probably be grown were it not for conditions that are chiefly due to the policy of our Government in those islands.

Obstacles That Could Be Overcome

The United States Congress, fearing large corporations and monopolies, adopted a policy for the Philippines that is working to the detriment of their healthy development.

A limitation contained in the fundamental law of the Philippines makes it impossible for a corporation to own or control more than 2,500 acres of land. The amount of land under cultivation compared with what could and should be worked, is so small that the acquisition of it by great corporations, far from being an evil, should be of decided advantage.

While there is no restriction as to the amount of land which an individual may lawfully own, there is a restriction on the amount of public land which he may purchase, which cannot exceed 40 acres.

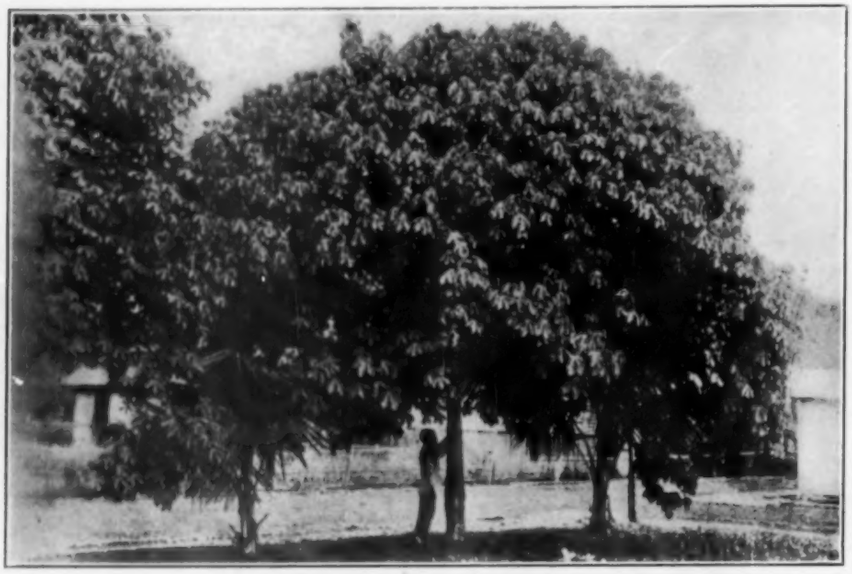
It is argued that if the product from 2,500 acres is not sufficient to make a modern rubber plantation a profitable undertaking, several individuals or corporations could overcome this handicap by each purchasing or renting the maximum permitted by the law and making such arrangement relative to the sale of their products as might seem advantageous to them. But such makeshifts are not practicable in costly enterprises like rubber planting, and as long as it remains impossible to permanently acquire more than 2,500 acres, where 250,000 would be desirable, American capital cannot be expected to develop rubber plantations capable of competing with those of the British, Dutch and French possessions of the Middle and Far East.

Labor

Those parts of the Philippines in which rubber can be successfully cultivated are sparsely populated and, as rubber planting requires a considerable amount of labor it would be necessary to import labor for rubber cultivation on an extensive scale. Labor could be obtained from other parts of the islands, from China or from India, but private enterprise cannot be expected to go to the great expense of importing labor without being fairly sure of getting returns for the outlay of capital.

A good example of what a government can accomplish, for the good of its people, by helping those who are willing to risk their surplus money in developing tropical plantations is in the Dutch East Indies where the Netherlands Government has done all in its power to provide labor and stability of conditions, and where American enterprise has

proved remarkably successful in rubber planting. In Sumatra, as in the districts of the Philippines where it is possible to grow rubber, native labor is scarce and coolies are imported. The Dutch Government undertakes to supply Sumatra plantations with practically an unlimited number of workers which it obtains chiefly from Java. The same government sees that none but equitable contracts are entered into and that coolies respect their agreements.



A Ceara Rubber Tree in the Philippines

If American, or any other, capital is to be invested extensively in rubber plantations in the Philippines, it must be made possible for corporations to permanently acquire large tracts of suitable land at reasonable prices. The Government will have to back up capital in its task of developing the wealth of American territory; it will have to protect it from the intrigues of native politicians and from foreign aggression. Capital must feel that it will be given a fair chance, otherwise it will not attempt such large and costly undertakings.

These are obstacles to the development of rubber planting in the Philippines that can be overcome by proper legislation and intelligent government.

Favorable Conditions

Rubber grows and is cultivated successfully in the southern part of the Philippines outside the typhoon belt. Rubber yielding trees ordinarily planted are brittle and are liable to fatal injury as a result of heavy wind storms. There are extensive areas of public land suitable in every way for rubber planting in the islands of Mindanao, Basilan, Tawi Tawi, and Palawan, where large districts are almost entirely free from violent wind storms.

Land in the Agusan Valley in the northern part of Mindanao is especially well suited to rubber growing. Plantations in the vicinity of the river itself would have the advantage of uninterrupted communication with the sea by water. Droughts are absolutely unknown in this region. While it appears to be heavily wooded, most of the vegetation is in the form of comparatively small trees and vines which can be cleared away at reasonable expense, leaving a few large trees which may be allowed to stand without interfering with the growth of any plants not harmed by a moderate amount of shade.

In the subprovince of Bukidnon on the same island there are immense plains covered with pasture grass which is not over waist high. Here the land could be readily brought under cultivation without any preliminary clearing. The drawback to this district for rubber planting is that droughts, though rare, occur about once in five or six years. It would be possible, though costly, to overcome this by irrigation.

In the Moro Province, and anywhere in the southern half of the island of Palawan where conditions of climate and soil are favorable, rubber plantations might be located without any serious danger from heavy wind storms. The elevation above sea level would be so slight as to be neglible, except in the Province of Bukidnon, where the maximum elevation would be 3,000 feet, a height above which it is not deemed desirable to plant either Hevea or Ceara rubber.

Transportation

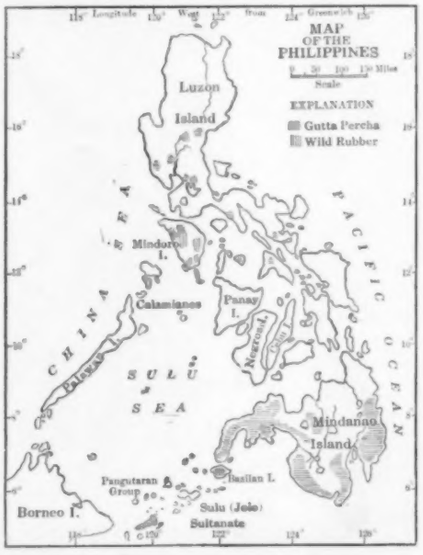
Transportation in the subprovince of Agusan would be by the Agusan River to the town of Butuan; thence by local steamer to Cebu. The Agusan River is navigable for a distance of more than 100 miles from its mouth and even during the dry weather has a depth of at least three feet.

Wild Rubber

The natives formerly gathered a considerable amount of wild rubber which they obtained from vines in the Cotabato Valley in the island of Mindanao either from the head waters of the Rio Grande or from the foot hills along one of its branches, the Dansalan. The hill tribes who collected this rubber sold it at Cotabato or to Indians who bought in that market. Some also was exported through Sarangani. No distinction is made locally between gutta percha and vine rubber, both being usually mixed together while still in latex form.

The rubber vines of the Philippines are of the *Apocinaceae* family. They grow from fifty to two hundred feet in length and with a diameter of six to eight inches.

In collecting latex the natives first pull the vine down to the ground to be better able to tap it along its entire length. The latex is caught in cocoanut shells or in leaves. Properly prepared it gives a rubber of fairly good



quality but the natives usually mix the latex with gutta-latex. Occasionally they coagulate rubber latex by pouring it into sea water. Coagulation is instantaneous and the resulting rubber is white, tough and very elastic. It keeps well in salt water, but upon exposure to air blackens and decomposition slowly sets in.

The vines generally die after being pulled down and tapped, probably because of their inability to again reach light and sunshine. The destructive methods employed in gathering have made rubber vines very

scarce in those districts that are most accessible.

Plantings

Three kinds of rubber yielding trees have been planted in the Philippines, Ceara (*Manihot Glaziovii*), Para (*Hevea Brasiliensis*) and Castilloa (*Castilloa Elastica*). *Ficus Elastica* was also planted but chiefly for ornamental purpose, and as in India, its habitat, it has been discarded as a rubber producing tree.

The principal rubber plantation in the Philippines is that of the Basilan Planting Company, of which Dr. J. W. Strong, formerly of the Science Bureau, Manila, is manager.

Dr. Strong's plantation is situated about a mile from Isabela on the island of Basilan. Of the 2,500 acres owned by the company approximately 1,100 are under cultivation in rubber and cocoanuts, about equally divided.

Originally, Ceara was almost exclusively planted, followed quickly by Para (*Hevea*) and Castilloa. While the first grew well and many of the trees reached suitable size for tapping, it was found to be so liable to injury by wild hogs, deer, and termites, all very fond of its starchy roots, that it was neglected for the other species.

The San Rafael Plantation is situated about a mile and a half from Dr. Strong's plantation with which it is connected by a trail. Most of the trees of the estate are Ceara and Castilloa. Hevea is also grown. Lack of labor has prevented cultivation and much damage has been suffered from wild hogs.

The Rio Grande Estates Company operates a large plantation at Reina Regente, Cotabato, Mindanao, but has made little progress chiefly because of lack of labor.

Along the banks of the Rio Grande the land is too low and too wet for rubber planting except in a few places. The best of these are in the vicinity of Reina Regente, where the south side of the river is approached by rolling hills, well wooded, attaining elevations of from 180 to 300 feet. Good land is said to be available farther up the river above Pikit but the transportation problem would be difficult and sufficient labor would be hard to obtain.

Reliable statistics regarding the present production of rubber and gutta percha in the Philippines are not obtainable as most of these commodities are gathered by the natives and are sold to Chinese traders on the coast. However, the quantity is so small that it has no bearing on the world's supply, and owing to the fact that the wild trees and vines are being destroyed by the crude methods of the natives, it is probable that the amount of rubber gathered is decreasing each year.

PHILIPPINE LABORERS

In the southern islands of the Philippine group, it is quite possible to grow rubber on a commercial scale, but before investors will consider the proposition an inviting one, the Government must remove restrictions on land ownership and provide for conditions that will attract labor and give capital a sense of security and protection. Then rubber growing on a commercial scale may be expected.

De Villers Process of Rubber Reclaiming

Due to the difficulty of separating rubber from its combined sulphur the practice of reclaiming is confined to other objects than the production of a substance simulating crude rubber in all its properties. The typical characteristic of reclaimed rubber is its greater plasticity and larger amount of rubber substance compared with the waste from which it is produced. Once this plasticity is imparted to rubber it can be used with considerable freedom in new compounds.

A very important question in reclaiming is the separation of the textile materials mixed with the waste rubber. The mineral fillers are not very objectionable so long as they do not interfere with the plasticity, since they are normal constituents of many compounds. This is not the case with textile materials which must be removed as far as possible. This can be done by blowing them away from the finely divided waste, a method that does not effect a very complete separation, or they can be destroyed by chemical means. For the latter purpose either acids or alkalis may be used, but the fabric, which is a valuable product, is lost.

A new process invented by C. de Villers, a Frenchman, is said to isolate the rubber without destroying the textiles with which it is mixed and to produce a reclaimed product having all the qualities of crude rubber.

In this process the rubberized fabric is placed in a vat containing tetrachlorethane. The vat is heated, either by direct heat or by steam, until the tetrachlorethane boils. The vapors produced pass into a condenser and are recovered. First, the rubber swells, then it dissolves in the liquid and, after boiling one hour, the fabric is completely separated from it and the heat is cut off.

To obtain the rubber, water is added to the solution; boiling causes the solvent to be carried away by the steam it generates.

When it is desired to remove uncombined sulphur, heating is continued only until the sulphur is dissolved. This occurs when the rubber begins to swell, the tetrachlorethane is then run off and replaced by fresh solvent before the rubber is attacked. The fresh solvent is boiled in turn until it completely dissolves the rubber.

Vulcanization of Rubber

(Abstract of a paper read by W. A. Gibbons at the "Colloid Symposium" of the American Chemical Society, September 28, 1916, in Havemeyer Hall, Columbia University.)

Vulcanization of rubber was discovered in 1839 by Charles Goodyear. His process was satisfactory commercially, and as a result the rubber business grew from practically nothing to an industry which now utilizes two hundred or more million dollars worth of crude material a year. During that time the manufacturers have gotten along very well without knowing much about what takes place chemically. It was not until 1902 that the first real attempt was made to determine what happens when rubber is vulcanized.

By taking crude rubber, adding a certain amount of sulphur, and heating, the material is changed from a plastic mass, which is colloidally soluble, into a more or less stable substance which is not particularly affected by cold and moderate heat.

Chemical Theory

C. O. Weber, in England, took up the question of vulcanization in 1902. According to his view, the rubber and sulphur combine chemically, forming a series of addition products, with $C_{100}H_{160}S$ as the lower limit and $C_{100}H_{160}S_{20}$ as the upper. The latter figure he arrived at by analyzing the product obtained by vulcanizing rubber with a very large excess of sulphur. He found in every case that the end product contained 32 per cent sulphur, corresponding to $C_{10}H_{16}S_2$. In view of the fact that at least 2 per cent of combined sulphur is needed to produce any marked change in crude rubber, he concluded that the compound corresponding to this, $C_{100}H_{160}S$ was the lowest sulphide. This theory was held for several years; in fact, it is considered by many to be the real explanation of the matter. One particularly interesting point in his work will be referred to here, as it comes up later. Using a constant original amount of sulphur, he determined the amount of combined sulphur after heating different lengths of time at a fixed temperature. He found that instead of obtaining a smooth curve, when time of heating was plotted against per cent of combined sulphur, he had a curve with a series of notches. He could give no explanation of this.

Both Hinrichsen and Spence, with their collaborators, have done a great deal of work on this chemical theory and came to the same general conclusion, namely, that there was a chemical reaction. Spence's work was particularly interesting. He heated mixtures of rubber with 37 per cent sulphur for varying lengths of time, determining the free and combined sulphur in each case. He found a constant increase in combined sulphur up to 31.97 per cent. Further heating caused no increase in this figure, indicating that the compound containing the highest amount of sulphur was Weber's $C_{10}H_{16}S_2$.

Adsorption Theory

The matter stood this way until a few years ago, when W. Ostwald brought out the adsorption theory of vulcanization. He said that it was not at all a question of chemical reaction, but simply a case of physical-chemical adsorption. Some of his principal arguments were as follows:

1. After vulcanization some free sulphur is always left, which would not ordinarily occur in a chemical reaction.
2. The *chemical addition* of Weber's theory is explained equally well by adsorption or *physical addition*.
3. Although a continuous series of sulphides is supposed to be formed, the end products have not been isolated. (The compounds mentioned by Weber and others have never been obtained pure—that is, have never been isolated as such. The colloidal nature of the material makes ordinary chemical methods of separation and purification inapplicable.)
4. The sulphur may be removed by suitable solvents and long treatment.
5. Mechanical working of rubber has an effect on subsequent vulcanization, which is contrary to our experience with most chemical processes.
6. The temperature coefficient calculated from Weber's data, 1.87, corresponds more with that of adsorption processes (136) than with that of a chemical reaction (2.0-3.5) as given by Van't Hoff. (Mr. Gibbons stated that this objection on the face of it does not seem serious; 1.87 is decidedly closer to 2 than to 1.36; furthermore the manifestly wide range of 2.0-3.5 for chemical processes makes a value of 1.87 seem reasonable.)
7. The notches observed by Weber are analogous to Van Bemmelen's observations with inorganic colloids adsorbing water (presumably silicic acid gels).
8. The experimental data of Stern are more in accord with adsorption than with a chemical reaction. (Stern worked with sulphur and rubber dissolved in fused naphthalene and obtained the equation

$$\frac{x}{a} = kc^m,$$

typical of an absorption process, where

x = adsorbed sulphur
a = rubber
c = initial sulphur
m and k = constants.

With the exceptions noted these arguments as they stand are undoubtedly strong. Spence disagreed with Ostwald's theory, and in a very interesting paper brought out the following points, based on new experiments made under carefully regulated conditions.

1. Sulphur will all combine ordinarily. He showed a steady rise with time, until the combined sulphur was practically equal to the original. He always had at the end of an experiment a little less total sulphur than the amount with which he started, but believes that this was in part volatilized and in part taken up by tinfoil used to wrap his rubber.
2. $C_{10}H_{16}S_2$ is the end product, as already shown.
3. With free sulphur present in the cured sample before extraction there is a distinct end to the amount extracted. As a result of experiments in extraction, Spence concluded that the free sulphur was in part adsorbed by the rubber, its extraction with acetone corresponding to an adsorption curve.
4. The temperature coefficient is 2.65, according to his last experiments.
5. No notches are present, as noted by Weber. (Mr. Gibbons called attention to the fact that this makes an explanation for them unnecessary, and makes invalid the argument as to analogy with other adsorptions.)
6. The amount of sulphur combining with the rubber is proportional to the time.
7. There is a definite stoichiometric relation between the amount of sulphur combining with rubber, and the amount of bromine that vulcanized rubber can combine with chemically. Vulcanized rubber treated with bromine loses its

sulphur, which forms sulphur bromide, the rubber combining chemically with the bromine. In this reaction bromine replaces sulphur in the ratio: $Br_2 : S$.

Ostwald objected to Spence's conclusions, pointing out that he did not use a great enough excess of sulphur and that the small amount lost was a serious matter.

Polymerization Theory

Axelrod, one of the exponents of this theory, considered that the process of vulcanization consisted of alternate depolymerization and repolymerization of the rubber. He tried two samples of rubber, one heated one-half hour at 120° before vulcanizing, and the other unheated, vulcanizing under the same conditions. He found that the heated sample combined with 3.07 per cent sulphur, the unheated sample 2.91 per cent.

His idea was this: starting with crude rubber, which he considered relatively inert to sulphur, the first heating causes depolymerization of the rubber. As it depolymerizes the rubber becomes more reactive to sulphur and combination occurs. The compound formed is relatively inert to sulphur, but under the action of continued heating it depolymerizes, becomes reactive, and combines with more sulphur. The process proceeds roughly as illustrated here:

$$\text{Rubber} \xrightarrow{\text{heat}} \text{depol. rubber} \xrightarrow{\text{sulphur}}$$

$$\text{rubber sulphide (1)} \xrightarrow{\text{heat}} \text{depol. rubber sulphide.}$$

As to just what happens chemically when the substance depolymerizes he does not say. He points out that the above cycle would correspond to the notches observed by Weber, the flat places corresponding to slow reaction representing the depolymerization by heat of the inner products. (Mr. Gibbons called attention to the fact that if the notches do not exist, as the latest results seem to prove, this clever explanation would of course be unnecessary.)

Kirchhof has worked on a theory somewhat like this, going more into the mechanism of the reaction. He tried the viscosity of rubber solutions, then added sulphur chloride solutions of known viscosity and measured the viscosity of the resulting mixture. He found that at first the viscosity decreased, then increased very rapidly. Assuming that the viscosity is an index of the amount of polymerization, the process would thus involve depolymerization, followed by polymerization, this last step representing vulcanization. In the case of sulphur, he concluded that the heat first depolymerized the rubber—this left some of the bonds unattached, and combination took place under the catalytic action of the sulphur. Tetramethylene rings were formed, the sulphur adding onto the carbons of these rings to form a hetero cycle. According to Kirchhof, the sulphur does not itself vulcanize the rubber, but only acts catalytically. The polymerizing action is the important one.

Thus we see that up to this time there have been three fairly well defined theories:

1. Chemical theory
2. Adsorption theory
3. Polymerization theory.

Ostromislensky Theory

The matter stood thus until this year, when I. I. Ostromislensky, a Russian chemist, brought out another very interesting theory, citing experiments to support his views.

His work was a case of a man working to prove a theory which he later abandoned, and apparently finding results more interesting than he expected. He had already done some work on the addition compounds of aromatic hydrocarbons with other substances, such as picric acid. Rubber being an aromatic hydrocarbon, he concluded that similar reactions might occur. He tried substances particularly good at forming these compounds, such as aromatic nitrocompounds. He found that these acted as vulcanizing agents, but not apparently in the way he had thought. The substances best at forming these double compounds were not necessarily the most efficient vulcanizing agents. He concluded that the nitrocompound acted chemically on the rubber, presumably giving up oxygen. He tried, accordingly, another substance which should give up oxygen readily, benzoylperoxide, and this likewise vulcanized.

In view of the fact that such widely differing substances, physically and chemically, as sulphur, organic peroxides, nitrocompounds and sulphur chloride produce similar results, it seemed likely that the properties of vulcanized rubber are not those of a simple chemical compound of rubber. He abandons all old theories and adopts a new one involving, first a chemical reaction, followed by adsorption. He concludes that the vulcanizing substance acts chemically on a small part of the rubber, forming a rubber derivative. This rubber derivative is the vulcanizing agent—it is adsorbed by the remaining rubber. He uses the unfortunate simile of camphor and nitrocellulose. From a colloidal standpoint vulcanization is more like the coagulation or hardening of a gel—e. g., gelatine with tannin, than formation of a solid gel like camphor in castor oil with nitrocellulose. Since, according to his theory, the rubber derivative formed in the rubber acts as a vulcanizing agent, it should be possible to add the rubber derivative already made to uncured rubber and have vulcanization. He tried rubber bromide and hydrochloride and found that they actually vulcanized. These halides are, in general, not at all like rubber or any vulcanizing substance—being dry, neutral, rather inert powders. We have, according to Ostromislensky, in those cases vulcanization pure and simple with no chemical reaction accompanying it.

Thus we see that according to his theory the true explanation is a compromise between the chemical and adsorption theory. We may have chemical reaction, but the vulcanized rubber is not the product of this reaction, and there is adsorption, but the vulcanizing agent, sulphur, is not adsorbed as such.

BOOK REVIEWS

TROPICAL AGRICULTURE, by Earley Vernon Wilcox. 373 pp., 32 illustrations; D. Appleton & Co., New York and London. 8vo. Cloth, $2.50 net.

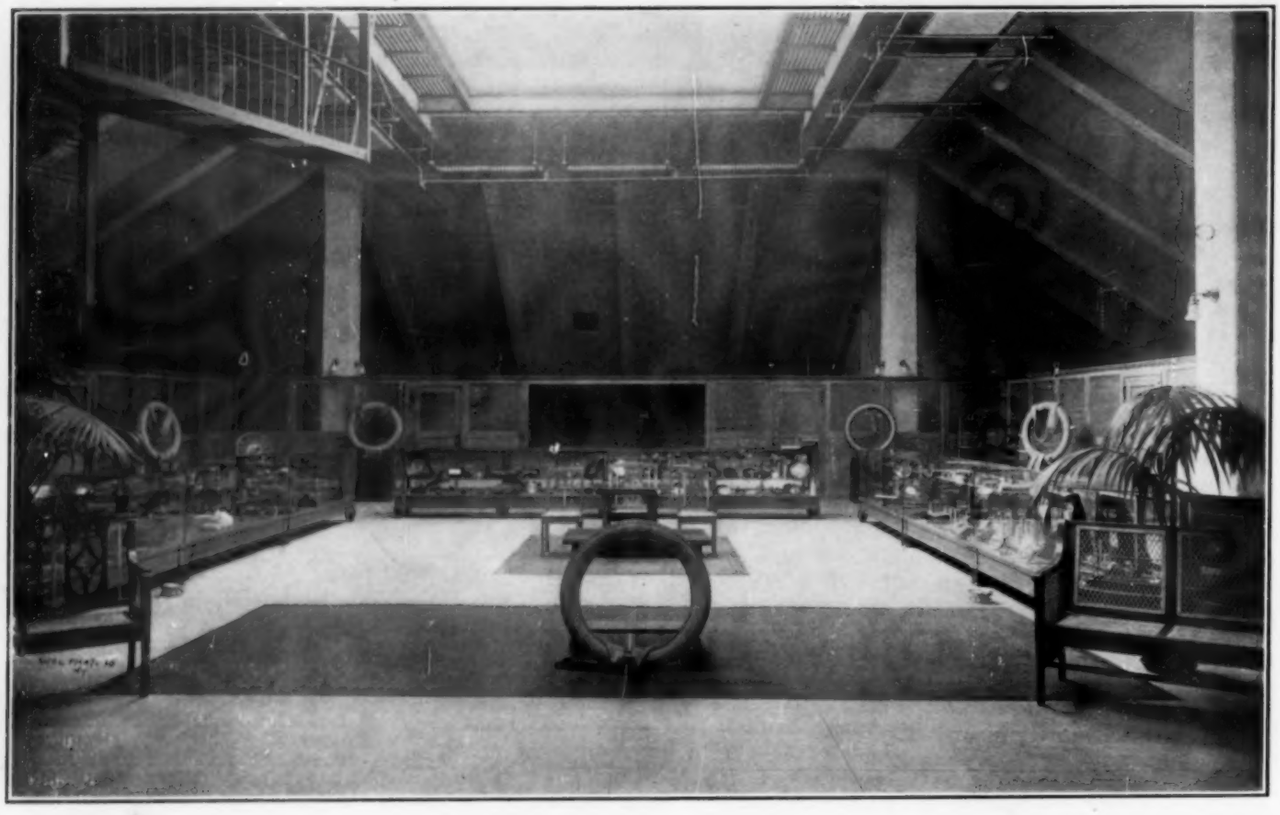
This book is probably the most comprehensive one on tropical agriculture ever written by an American. The author, now an administrative assistant in the States Relations Service, United States Department of Agriculture, was for six years in charge of the Hawaii Experiment Station.

Written from the standpoint of the general reader, business man and agricultural student, this volume deals with tropical agriculture in the commercial sense, the production of things to eat, to wear and use in technical industries. It presents in a brief form what everybody ought to know about the tropics. Particular attention is given to the nature, source and commercial importance of tropical products.

Under the heading "Rubber and Gums," the author gives a historical review of rubber, describes the various rubber-producing plants and their latex-secreting tissues, tells what latex is, how it is collected and coagulated and gives an outline of the importance of the development of rubber plantations.

Speaking of the unimportant position occupied by the United States in crude rubber production, Mr. Wilcox says that in Hawaii there are about 1,500 acres of Ceara that are old enough for tapping and have in fact been tapped with success for three or four years, but that rubber cannot be produced at a profit on the Hawaiian plantations when the market price of rubber is less than 55 cents a pound. Tapping has, therefore, been suspended temporarily until the price of rubber has improved. Hevea does not thrive well in Hawaii except in places protected from the trade winds. In this same chapter, gutta-percha, balata, jelutong, chicle are described together with their botanical and geographical origin and their commercial values. The methods used for collecting these rubbers are described.

Beside this chapter being of particular interest to students of rubber, the volume contains an account of about 350 tropical products of peculiar interest and commercial importance. It also presents a clear description of the animal industry in the tropics, as well as of the climate, soils and economic conditions.



Making the Tire and Accessories Salesroom Attractive and Profitable

Reasoning that an attractive and convenient salesroom which is inviting to customers adds largely to the sales of tires and accessories, the Willys-Overland Co. has adopted the policy of offering its patrons the same comfortable accommodations and attentive service as is given by department and jewelry stores to their customers.

In keeping with the tendency of automobile manufacturers giving more attention to the sale of tires and accessories, this company has opened elaborate accessories departments in its numerous branches throughout the country and is educating its dealers everywhere to the necessity of giving careful attention to this important branch of the business, which in the past has been more or less neglected.

The accessories salesroom of the New York branch of this company is a model of its kind. It is a large, commodious, well-lighted and attractive room, much in contrast with the usual treatment accorded accessories departments. The predominating color is a soft gray and the effect of the whole is pleasing.

A complete line of accessories, comprising tires, inner tubes, tire air gauges, blow-out patches, anti-skid chains, chain repair tools, clothing, robes, collapsible pails of rubberized fabric, tire covers, fire extinguishers, rubber-framed goggles, tire pumps, tire tools, tire trunks and other items are attractively displayed in large, well-lighted show cases.

The basic appeal of this department is one of prompt, courteous service in the salesroom, where buying may be done by the owner of a car under most favorable conditions.

Of special interest is the system under which this accessories department is conducted.

Quantity Purchases

The accessories department of the New York branch purchases tires and other accessories in large quantities, not merely for its own retail sales, but also for the combined accessories business of the other branches and for Overland dealers.

Perpetual Inventory System

The method used for preventing "slips" is simple and efficient. Following is a description of how this system works when an item of merchandise is received, checked, placed in stock, sold and accounted for.

Take as an instance an order for 500 tire valves on which a delivery of 300 valves is made. Upon receipt of this delivery the stock department makes out, in quadruplicate, a

WILLYS-OVERLAND Inc.

BRANCH NO. 112, NEW YORK, N. Y.

GOODS RECEIVED REPORT ON PURCHASING DEPT. ORDERS

THE FOLLOWING GOODS HAVE BEEN RECEIVED THIS DAY

DATE ..... 191.. No.

TIME .....

SHIPPER ..... POINT OF SHIPMENT AND STATE .....

VIA { EXPRESS TICKET No. ..... BOXES ..... PACKAGES ..... MARKS ..... WEIGHTS .....
BY. CO. PRO. No. ..... CRATES ..... SACKS ..... BILL ..... CAR No. ..... INITIALS .....

EXPRESS OR FREIGHT CHARGES WE PAY ..... T. B. D. ..... OTHER CHARGES ..... RECEIVED BY ..... ENTRY MADE BY ..... INVOICE—DATE ..... PURCHASING DEPT. No. .....

	ARTICLES	PURCHASE ORDER NO.	INSPECTED BY RECEIVING DEPARTMENT	Company's Weights or Quantities			INVOICE
				GROSS	TARE	NET	AMOUNT

Goods Received Report

PART NO.	DESCRIPTION	PRICE	BIN NO.	MINIMUM

DATE	ORDER No.	AMOUNT	DATE	REFERENCE No.	REC'D	DEL'D	BALANCE	DATE	REFERENCE No.	REC'D	DEL'D	BALANCE

INVENTORY CARD

" goods received report " based on a copy of the purchasing department's order for the valves and a count of the valves actually received. A copy of this report is kept for stock record, while the other copies go to the accounting department and the inventory clerk of the branch and to the purchasing department in Toledo. From the copy he receives the inventory clerk makes out an inventory card for his files.

The stock clerk places the valves in a numbered bin provided for them and makes out a " bin card," which is kept in a special holder inside the bin and bears note of the nature of the goods, their list price and the quantity of goods received. In the case under consideration, the entries on the bin card would show, in addition to this, in its " B. O." (back order) column that 200 valves still remained to be delivered on the order for 500 valves.

When a customer purchases valves and pays for them a " cash order " is made out in duplicate, one copy of it serving to obtain the valves purchased from the stock room, the other going to the clerk who makes out an invoice for the customer, and a " mail order," in quadruplicate. One copy of the " mail order " is kept for record, one goes to the inventory clerk, one to the accounting departmemnt, and the last to headquarters in Toledo.

From the " cash order " the stock man enters on the " bin card " the date of the order, its number and the quantity of goods delivered under it. Further, he indicates on this card the balance of valves on hand after the order has been filled, while the inventory clerk uses his copy of the " mail order " for making similar entries on his inventory card.

In this manner a perpetual inventory is provided that can be checked and counter-checked. To guard against the possibiiity of allowing the stock on hand to run too low before making a requisition for its renewal, a " danger mark " or safety minimum is written on each " bin card," so that when the stock shrinks to this limit the stock man notifies the manager of the department, who has time to send his requisition to the purchasing department and to get in new stock before the old is exhausted. It is when the " danger mark " is reached that the " back order " note on the " bin card " acts to save the stock man from making a requisition for new stock when there still remains goods to be delivered on the original order. In such a case instead of placing a new order it is sufficient to demand back order delivery.

Willys-Overland, Inc.

Remittance for this Invoice must be sent to this office ☛

150th and Gerard Streets
New York, N. Y.

Sold to

Order No

Terms Net Cash
Subject to Draft After 30 Days

This Company assumes no responsibility for loss or damage of vehicles placed with us for storage, sale or repair.
All claims for shortage and all inaccuracies must be reported within 10 days.

Form 246 M-B-F

INVOICE FORM

Future of Innovation

The step taken by the Willys-Overland Co. in entering the motor accessories business on a country-wide scale is a development of far-reaching importance. Meeting with public approval and being a financial success, this innovation is likely to be followed by other large manufacturers and distributors of automobiles, whose broad organizations are likely to make them such large buyers that it may not be many years before they become manufacturers as well as wholesale and retail distributors of automobile equipment and accessories.

Bin No. Lot Price

Date	Order No.	Quantity	Balance	Date	Quantity Ordered	Rec.	B. O.

BIN CARD

An American Rubber Plantation

The photograph on our front cover was taken on one of the rubber plantations in Sumatra, owned by the General Rubber Company.

The native collectors are shown with cans into which they empty the small cups containing rubber latex that has run from the trees tapped a few hours before the picture was taken. Once emptied, the cups are again placed at the foot of the trees where they will receive the latex flow at the next tapping. The cans go to a centrel station or factory where the latex will be coagulated.

The Sumatra estates of the General Rubber Company, cover approximately 100,000 acres of land, of which about 45,000 acres are under rubber cultivation.

ORIGINAL

THE WILLYS-OVERLAND COMPANY, TOLEDO, O.

M. O. № 240277

Ship to Date

Street

City State Customer's No.

Via B. L. No. Date Shipped

Folio

Billed by

Checked by

CHARGE TO Shipper's Initials

City State Weight

Terms Boxes Crates Packages

ORDERED	SHIPPED	ARTICLES AND DESCRIPTION	PRICE	DETAILS	TOTAL	TOOC

" MAIL ORDER "

Specifications for the Navy "Blimps"

A "blimp" is a small dirigible balloon from which is suspended a car or body equipped with gasoline engine and propeller, similar to those used on airplanes. The chief use of the "blimp" at present is to patrol cities at night to give warning of approaching Zeppelins, and during the day to locate submerged submarines in the waters of the war zone. For both of these purposes this type of aircraft has proved most efficient.

"Blimps" were unknown before the war. The earliest type consisted of the gas bag of a kite balloon, from which was hung an airplane body or fuselage equipped with engine and propeller. Soon modifications of this primitive form appeared which were designated by the symbols "SS," popularly interpreted as "submarine spotters," and later as "sea scouts." However, they subsequently became known as "blimps," now their generally accepted designation.

The "blimp" is far superior to the airplane for the character of duty for which it is designed. For patrol work it can hover over a city for an entire night at sufficient altitude to watch for coming dirigibles. It can stand still or move slowly, while an airplane, equipped as it is with fuel for three or four hours, must maintain its full speed of from seventy to one hundred miles an hour. When an approaching enemy is sighted, the "blimp" notifies its station by radio, and its duty is ended when the fast fighting airplanes rise from the ground.

As submarine spotters, "blimps" have proved themselves most valuable. Besides being equipped for at least ten hours' cruising fuel at full speed, they can safely rest without moving, whereas airplanes fall unless the speed of forty miles an hour is maintained. It is further considered unsafe practice for airplanes to fly below an altitude of 1,000 feet. For submarine spotting this is too high, as wave movements must be carefully observed in order to locate the position of a submerged enemy. The "blimp" can travel near the water, and its low speed renders careful observation possible.

According to the Navy Department specifications, sixteen "blimps" have been ordered. The gas bags, which will be made of rubberized fabric, are 160 feet long, 3½ feet high, and have a content of 77,000 cubic feet. The body, suspended from the balloon, contains an engine designed to propel the dirigible at the rate of 45 miles an hour.

In case of war many balloons of this character will doubtless be required to patrol our coasts and to guard the coast cities. Makers of balloon fabrics and other manufacturers of spread goods may suddenly find a large demand for this line of material. They may also be called upon to make the gas bags, as this work requires the services of experienced rubber workers.

The specifications for the construction of sixteen "blimps" for the Navy Department are given below in condensed form for the information of manufacturers who desire to familiarize themselves with the conditions controlling this work:

THE PROPOSAL*

Bids are desired on the basis of furnishing 1, 2, 4, 8 or more dirigibles complete with necessary power plant, and equipment and outfit to be delivered at any point designated by the Government on the Atlantic or Gulf coasts of the United States, and final acceptance tests to be completed within 120 days after date of contract or bureau order. Alternate bids for a greater time of delivery and completion of tests will be considered. Bids are desired on:

1. *Dirigibles.*—Includes the dirigible proper, with car, envelopes, control faces and leads, blowers and fittings, engine covers, cockpit covers, etc., together with the necessary crating.

2. *Power Plant.*—Includes motor, propeller, radiator, gasoline and oil tanks, piping, controls, gasoline and oil gauges, and shipping crates.

SPECIFICATIONS

When the destination of such dirigible is determined the contract price will be modified to include the transportation charges.

Guarantee.—The contractors must guarantee the dirigible for three months from date of delivery. Any defects which may develop within that time which can be attributed to faulty workmanship, material, or design must be made good by the contractors without cost to the Government.

Bonus and Penalty.—If the dirigible satisfactorily completes its acceptance trials before the expiration of four months, a bonus of $100 per day will be paid for each day so saved up to 30 days. Liquidated damages at the rate of $100 per day will accrue for each day beyond the four months period until the ship is given satisfactory trials, subject to remission for causes.

The total bare weight shall not exceed the figure given in the weight statement marked "Penalty weight," and any overweight shall render the ship liable to rejection. A bonus of $5 per pound will be paid for each pound of weight as listed above which the contractor can show has been saved.

Weighing of Material.—All material of every description placed on or attached to the dirigible shall be weighed, together with all material of every description which after being weighed and placed on or attached to the dirigible is removed; the weight and description of the part weighed in all cases to be reported to the inspector. Where material is assembled before being weighed the center of gravity of such assembly shall be ascertained. The center of gravity of each part or group of parts entering into or attached to the dirigible shall be reported in relation to the nose of the dirigible and from the axis of the envelope.

Trials.—The acceptance trials shall be conducted by the contractor, who shall furnish all necessary gas, fuel, or other material and the operating personnel. The contractor may select good weather for the trials in which the wind velocity at a height of 100 feet from the ground is less than 15 miles per hour. The department expects to have ready sheds for housing the dirigible at the point of delivery, and it is agreed that the contractor shall have the use of such shed from which to conduct the trials. In case trials are held from a Government shed, the Government agrees to provide hydrogen gas at a cost to the contractor of 1 cent per cubic foot, and also labor for handling the dirigible on the ground under the supervision of the contractor. The contractor may conduct the acceptance trials at a place selected by him, furnishing his own gas, labor, shed, and all facilities.

The following trials shall be conducted:

(a) *Endurance Trial.*—With full load at start consisting of the bare weight listed in the weight statement and a useful load of 2 men, full supply of fuel and oil and such ballast as the contractor may choose to carry, the ship is to be driven through the air continuously at full power for three hours.

(b) *Speed Trial.*—With any convenient load the ship is to be driven at a full speed through the air over a measured course at least 10 miles in length.

(c) *Maneuvering Trial.*—With any convenient load, the ship is to ascend to a height of 6,000 feet in 10 minutes, to descend from this height in 15 minutes, and to be so maneuvered as to demonstrate that she is completely under control in three dimensions both at full speed and at cruising speed.

NONRIGID DIRIGIBLE FOR COAST PATROL

This specification contemplates a nonrigid self-propelled dirigible or airship designed for use in conection with coast or harbor patrol. It is intended that the dirigible shall be operated from a base on shore, but that it shall be possible for it to rest upon the surface of the water in good weather.

The airship shall consist of a nonrigid envelope made of rubberized fabric and containing hydrogen under sufficient pressure to maintain the rigidity of the envelope. There shall be attached to the envelope vertical and horizontal fins and vertical and horizontal rudders, mooring line, rip panels, maneuvering and safety valves, ballonets or internal air sacks with means for their inflation.

Beneath the envelope and supported thereby is carried upon a suspension a car or body containing the power plant, fuel, ballast, personnel, radio, etc.

The envelope fully inflated has a displacement of about 77,000 cubic feet, corresponding to a gross buoyancy of 5,275 pounds when inflated with hydrogen of good commercial purity, and under normal conditions of barometer and temperature. Under these conditions the lift is reckoned at 0.068 pound per cubic foot, at 15 deg. C. and 760 mm.

The length of the envelope is 160 feet and the maximum diameter 31.5 feet; maximum width over tail fins, 36.2 feet; The center of buoyancy is 69.2 feet from the nose; the height over all is 50 feet; horsepower of motor, 100; horsepower of blower engine, 2; maximum safe altitude, 7,500 feet.

Designed maximum speed at an altitude of 600 feet, 45 miles per hour; endurance at full power, 10 hours; cruising speed, 35 miles per hour; endurance at cruising speed, 16 hours.

Capacity of tanks, 100 gallons, 600 pounds.

Total volume of both ballonets, 19,250 cubic feet.

Reserve ballast tank in car, 300 pounds of water.

Trimming tanks attached to envelope: Forward, 40 pounds of water; after, 50 pounds of water.

The following weight statement is furnished:

	Pounds.
Envelope (including seams, nose piece, and doublings only for ballonet attachment, tail group, grab ropes, and ballonet suspension, also belly band)	1,177
Gas valves and sight holes	36
Air ducts, air valves, and air manifold	54
Suspension, wire cable, crow's feet, grab ropes	35
Ballonets, including ballonet suspension	350
Fins and rudders, including their bracing	480
Running rigging for steering and rip panels, and parts of nose rope on envelope	43
Car:	
Structure (including tank weights)	321
Engine, mufflers, radiator and water, propeller and hub	568
Blower engine and blower	100
Starting crank for main engine	25
Lighting cells, wiring and lamps	30
Landing-gear and floats	58
Miscellaneous fittings, including jack stay, stirrups, and nose rope	57
Total "penalty weight"	3,334
Useful load:	
Pilot and observer	320
Instruments	100
Radio	250
Fuel and oil	670
Water ballast (including 90 pounds for trimming)	390
Sandbag ballast	211
	1,941

Aluminum shall not be used for important strength members, nor shall any strength member depend for its strength upon brazing, welding, or soldering.

Articles of equipment and outfit to be furnished and installed by the contractors: Tachometer, gasoline air pressure gauge, circulating water and lubricating oil theremometers, oil pressure gauge, longitudinal inclinometer, map boards, mooring rope, two gas pressure manometers and one ballonet air pressure manometer.

Articles of equipment and outfit to be furnished by the Government and installed by the contractors: Altimeter, statoscope, compass, air speed meter, fire extinguisher (chemical sprinkler type) and searchlight.

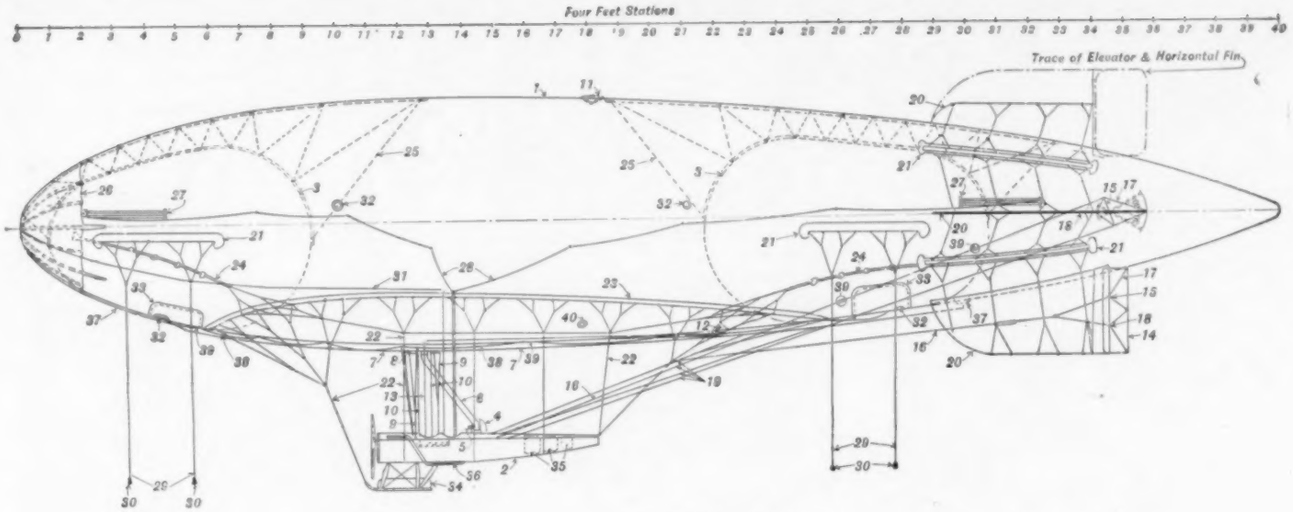
Protective coatings.—The envelope shall be made of rubberized fabric with a protective coating. The car shall have woodwork sandpapered and coated with heavy spar varnish.

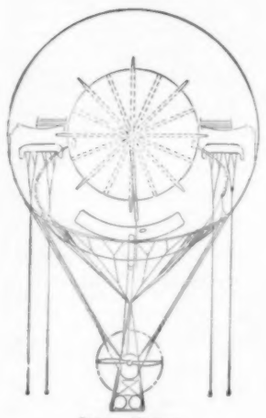
The fabric covering the car, fins and rudders, shall be coated with at least five (5) applications of nitrocellulose, and finaly coated with "Valspar" varnish or its equivalent. Portable canvas coverings for cockpits and power plant shall be furnished.

FABRICS REQUIREMENTS.

Factor of safety.—The contractor must be able to show that the fabric factor of safety under normal running conditions for any part

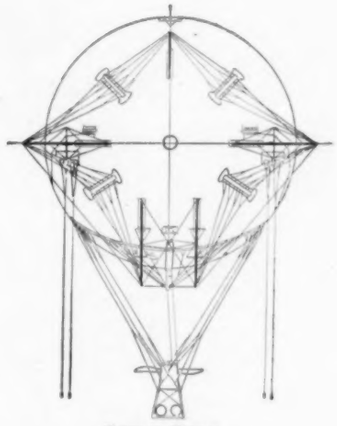
* Bids were opened on March 6, and the contracts were awarded on March 12.





BOW VIEW

1. Gas Envelope
2. Car
3. Ballonet
4. Blower Intake Pipe
5. Engine for Blower
6. Main Air Discharge Pipe
7. Air Pipe to Ballonet
8. Air Manifold
9. Operation Cord, Ballonet Exhaust Valve
10. Operating Cord, Butterfly Valve
11. Valve, Pressure Relief
12. Valve, Maneuver Gas
13. Operating Cord, Maneuver Valve
14. Rudder—Twin
15. King Post
16. Leads, Steering Gear
17. Bracing Wire
18. Elevator
19. Leads for Elevator
20. Fin, Stabilizing
21. Doubling Patch
22. Car Suspension
23. Belly Band
24. Webbing
25. Ballonet Suspension
26. Nose Reinforcement
27. Rip Panel
28. Rip Cord
29. Grab Ropes
30. Weights
31. Mooring Rope
32. Sight Holes
33. Patch for Removing Ballonet
34. Kapok Floats
35. Fuel Tanks
36. Muffler
37. Trimming Tanks
38. Operating Cords, Trimming Tanks
39. Guides for Operating Cords
40. Filling Hole and Doubling Patch



STERN VIEW

GENERAL ARRANGEMENT OF NEW NAVY "BLIMPS"

of the dirigible exceeds 8. The strength to be taken as a basis, to be found by the methods given below.

Construction of fabric.—All fabric used in the envelope or ballonets to contain two or more piles of cloth, one of which is to be laid on a bias of 45 degrees. Sufficient rubber of proper quality shall be placed in the fabric to meet the requirements as to diffusion and weather-resisting properties, which are given below. The protective coating on the outside of the envelope shall be at least 0.4 ounce per square yard, and on the inside 0.2 ounce per square yard.

No fabric in the balloon is to weigh over 12 ounces per square yard, and no fabric is to test less than 40 pounds per inch in the direction of any of the threads, either bias or straight, test to be made as described below.

Fabric in the top of the balloon shall show an average strength over 60 pounds per inch for the four different directions of threads; or a strength over 100 pounds per inch in either warp or filler if the two plies are doubled straight together for a sample test.

The fabric which is intended to separate air and gas shall have an average hydrogen diffusion not greater than nine liters per square meter per 24 hours, according to the procedure given below, and under a pressure of 30 millimeters of water.

Samples of the finished fabric shall be submitted to the naval inspector for approval before starting construction.

Method of weight testing.—The figure for the weight of fabric shall be obtained by getting the net weight of an entire roll and dividing by its superficial area in square yards.

Strength test.—Dimensions of samples, 2 inches wide by 6 inches long. Cut 12 samples from each roll, including 3 each from the warp and filling of the straight ply, and 3 each from the warp and filling of the bias ply. Place in the testing machine with 3 inches initial gap between jaws. The speed of separation of jaws will be 12 inches per minute. Use jaws 2 inches wide. A number of specimen seams shall also be tested by this method, enough to prove to the inspector that they are over 100 per cent. efficient.

Diffusion.—The following conditions are assumed when getting the final result for hydrogen diffusion:

1. Temperature 15 deg. C.
2. Pressure on the air side of fabric to be atmospheric with pressure difference of 30 millimeters of water.
3. Current of air to be maintained on the air side.
4. Fabric to "soak" in the hydrogen for at least 5 hours before starting test.
5. Run the test itself at least 2 hours and correct the result to apply to 24-hour period.
6. Keep the air stream perfectly uniform (about 5 bubbles per second through sulphuric acid).
7. Apparatus and method to be the same in principle as that used by the Goodyear Tire & Rubber Co., described by R. A. D. Preston.

Instead of running the test at 15 deg. C., which is the standard, it may be run at any fixed temperature up to 26 deg. C. by reducing the final result in the ratio of 15 divided by T where T is the temperature actually used. If it is desired to run at a greater difference in pressure than the standard 30 millimeters, this may be done for any pressure up to 50 millimeters by multiplying the result by $\sqrt{\frac{30}{P}}$ where P is the pressure actually used. A diffusion sample will be cut from each roll within 9 feet of one end.

Inspection.—All fabric going into the balloon shall be run over a light to detect pinholes and flaws in the threads, any such places being subsequently either proved of sufficient strength and tightness or patched. Inspector may require such tests of diffusion and strength on various parts of the fabric and seams as he may judge necessary to prove the quality required. Every seam will be inspected when completed.

Model test.—Each contractor for one or more dirigibles shall construct a model of linear dimensions one-thirtieth the size of the balloon, made of identical fabric, provided with suitable suspension disposed in similar fashion to that on the full-size balloon. This model to be inflated (upside down) with water to correspond with the full-size balloon when inflated to five times its normal running pressure. This will mean on the model a head of water at the top equal to 12½ feet. Leave pressure on for 10 minutes.

Tests on completed envelope.—Each envelope when completed shall be blown partially full of air and all fabric inspected from the inside against a light to detect small leaks. After inflation with hydrogen at normal operating pressure, the envelope must show a leakage of gas less than 1 per cent. per day, with all valves and accessories in place. Envelope, with ballonets in place, after inflation with hydrogen shall be inflated to a pressure of 3 inches of water at lowest point and held there for one minute. This is three times the normal pressure for flight, but no defects shall be developed by this proof test.

Guarantee.—The contractor shall guarantee the completed envelope for three months' continuous exposure to the weather or its equivalent, provided this does not occupy more than one year's time from date of acceptance. Under a pressure test at the end of this time the envelope shall resist without injury a pressure of 2 inches of water at the bottom. In case the envelope fails through deterioration to give the specified length of service, it shall be replaced by the manufacturer at the request of the Government and the manufacturer shall receive compensation for the service rendered by the first envelope pro rated on an arbitrary value of $12,000. Reasonable care shall be taken to keep the envelope out of the sun when not in use, and the fabric shall be dry and cool before packing. Hydrogen gas used shall be free from injurious chemicals or excessive moisture.

Tests shall be made of all fittings, so far as practicable, after completion and before installing in place. This testing shall include air and gas valves, gasoline tanks, oil tanks, blower engine, blower, and instruments; also means for controlling the trimming, ballast, and emergency discharge of fuel tanks. Samples of all wire, cable, rope, fabric, typical seams, patches, etc., shall be broken in a testing machine.

Such other tests shall be made as are necessary to determine that the requirements of the specifications have been fulfilled and that all parts and installations are suitable for the purpose intended.

Mooring eye.—The nose shall be reinforced by means of a doubling patch of fabric similar to that in the envelope and wood battens about ⅜ inch by 3 inches in section equally spaced,

converging at the nose, every alternate batten to extend beyond the doubling 3 feet. An eye shall be provided in the nose for the attachment of a mooring line. This eye will consist of a 1¾-inch metal thimble secured in an eye splice of a four-strand manila rope. The rope will be unlaid and the eight strands let in beneath the doubling patch, equally disposed radially, the ends of the strands frayed and the whole set in cement. The breaking strength of the mooring attachment shall be about 5,000 pounds.

Rip panels, four in number, shall be located approximately as shown with a rip cord, dyed red, run from each through light agate guides to the pilot. By pulling the rip cord weak stops securing the end of the panel are to break and tear open the panels for rapid deflation in an emergency.

Grab ropes, eight in number, shall be secured to patches on envelopes as shown. These to be 1½-inch circumference manila rope secured to crows'-feet of ¾-inch flax signal halyard stuff (braided of 3-ply thread in 8 strands of flax twine; breaking strength, 890 pounds).

Ballonets.—Their combined volume is 25 per cent. of the total volume of the envelope. The relative sizes of ballonets are to be adjusted so that their displacements give equal moments about the center of buoyancy of the envelope when completely inflated. The ballonets are to be fitted with a suspension band of fabric running around the plane of symmetry to which a light flax suspension is to be attached. This suspension holds the ballonet in place and prevents shifting fore and aft when flabby. Sight holes of transparent material are to be placed in the envelope for inspection of this suspension.

The lower part of the ballonet is to be secured to a patch of doubled envelope fabric sewed and cemented to the envelope. This patch when removed carries with it the ballonet and windpipe connection. A sight hole shall be located in the ballonet patch for inspection of inside of ballonet.

The *safety valve* will be located on top of the envelope. This valve is to automatically open outward when pressure in envelope at lowest point exceeds 1 inch of water.

The *maneuver valve* will be located under the envelope and will operate as a safety valve also, but may be opened by means of a line to pilot's seat.

The *belly band* or *suspension band* is to be a heavy fold of canvas running round the lower part of the envelope, bearing at intervals hardwood toggles for the crows'-feet of the car suspension. This band shall be securely sewed and cemented to the envelope in a manner which on test is shown to develop the full strength of the latter fabric.

Fins.—Stability of route is assisted by two horizontal fins and three vertical fins as shown. These fins are to be 170 square feet each in area except the vertical fin shown on top of the envelope, which will be 80 square feet in area, and are to be made up of a light structure of steel tubing and wood with internal wire bracing and covered with airplane linen treated with five coats of dope and varnished to give a smooth, taut surface. The fins are to be braced by wires with turnbuckles, and crows'-feet to doublings on the envelope. Weight of fins is to be kept down to one-half pound per square foot. Doubling patches shall be fitted on envelope to secure butt edges of fins by lacing.

Rudders.—Two horizontal rudders, each 70 square feet in area, and two vertical rudders, each 35 square feet in area, are to be provided. Both the horizontal and vertical rudders are to be balanced and to work in ball bearings. These rudders are to be securely trussed and operated by nonconducting leads (flexible cable of flax line) passing through agate guide rings, or ball bearing bronze sheaves as indicated on the plans. Rudder operating leads are to be designed to give the least number of turns so as to reduce friction to a minimum. Fins and rudders are to be readily detachable for shipment or stowage.

THE CAR.

Insulation.—The car is to be electrically insulated from the envelope and no valve or other operating leads shall be of continuous wire. All metal parts in car are to be electrically connected. Metal parts of valves and their seats, wherever located, shall be electrically connected.

Mooring line.—A mooring line consisting of 200 feet of 2½-inch manila rope is to be provided for carrying coiled in the car. The fixed part shall be stopped to the envelope and the end secured to mooring eye in the nose.

Steering controls.—All steering controls shall be in duplicate and interconnected. The vertical rudders shall be operated by means of foot bars, to be fitted with foot rests arranged to pivot so as to remain normal to operator's thrusts. The leads are to be fastened to the ends of the foot bar by a suitable fitting. The horizontal rudders are to be controlled by means of handwheels located on the right-hand side of the car. The hand wheels will be arranged to operate the leads by means of sprocket chain and sprockets. Both handwheels are to be provided with an effective band brake so that the horizontal rudders may be locked in position by means of an arrangement for increasing the tension in the brake band.

Tanks shall be provided sufficient for a 10-hour supply of fuel and oil at full power for the motor. A valve is to be provided for rapid discharge of gasoline to lighten the dirigible in an emergency.

Ballast.—The water-ballast tank shall be located in the body and be of 300 pounds capacity, and provided with means for rapid discharge from the pilot's seat. The tank is to be made of waterproof fabric and shall be tight when full.

In addition to trimming the dirigible by manipulation of horizontal rudders or shifting air between baloons, small water containers are to be placed near the bow and stern of the envelope, fitted with spring loaded valves, and means whereby such valves may be pulled open by the pilot. The forward tank shall contain 40 pounds of water and the after tank 50 pounds of water. The forward tank should be a fabric tube laced along a meridian with a valve in its lower after end. The after tank shall be as flat as possible and secured in a fabric pocket under the envelope and between the lower vertical fins. Tubes shall lead discharge from each tank to main ballast tank.

Blower system.—A 2-horsepower, 900-revolutions per minute engine of motorcycle type is to be arranged to drive through a 2 to 1 gearing a multivane blower of a capacity of 600 cubic feet per minute at 1,800 revolutions per minute against a head of 2 inches of water. A crank is to be provided for starting the motor which is to be accessible from the rear seat. (See *Radio.*)

A wind scoop is to be arranged to supply air to the blower, which discharges through suitable dampers into one or both ballonets. The wind pipes to ballonets are of balloon fabric and are to be 8 inches minimum diameter. The air manifold is to be made of sheet aluminum and provided with relief valves spring loaded to release air at three-fourths inch of water pressure.

Precautions shall be provided for the blower engine to prevent flame from back fire or exhaust.

Radio.—The radio outfit will be supplied by the Government and will be installed by the contractor. It will weigh about 250 pounds and will have a generator to be driven by the blower engine through a silent chain and 3 to 1 increasing speed gear. A friction clutch, to be designed so as to reduce weight to a minimum, is to be provided by the contractor so that the blower engine may be run idle or engage either blower or generator.

Car.—The car or body is of standard airplane type. The motor and radiator are to be mounted forward, with a sheet steel fire bulkhead behind them; next the pilot with all controls and instruments; next the observer with duplicate controls and radio key; next the blower and radio outfit; next a fabric tank for water ballast; and last the gasoline tanks for 10 hours at full power. Reserve oil and gravity gasoline tanks may be mounted near the motor. The car is to be inclosed with airplane linen except over the motor, where the covering shall be of sheet aluminum. The motor compartment shall be well ventilated and the bottom perforated to prevent accumulation of gasoline in case of leakage.

The negative buoyancy of the ship on landing will be carried by skids of ash to which are securely strapped, as shown, waterproof fabric cylinders stuffed with kapok fiber.

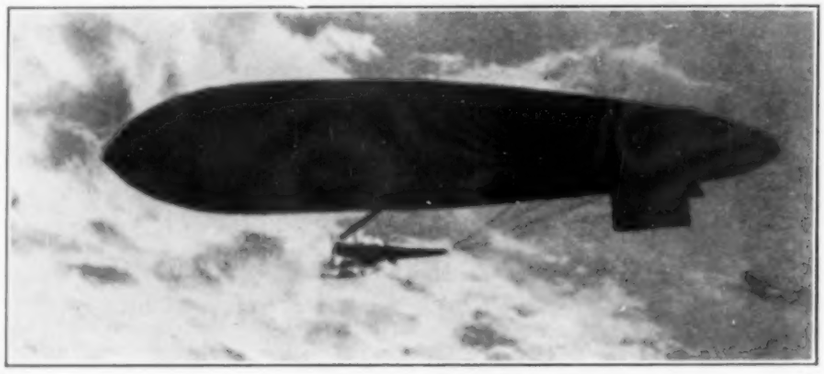
The pilot in the forward seat shall have all necessary and specified instruments and means for control of the ship. In particular his instrument board shall include two independent and different means for measuring the pressure of hydrogen in the envelope. The proposed hydrogen pressure-measuring devices are to be submitted to the Bureau of Construction and Repair through the inspector for approval.

The car shall have a jackstay along top and stirrups under bottom, as shown, to enable a man to reach motor or gasoline tanks in the air.

The maximum propeller diameter permissible is 8 feet 6 inches.

Suspension.—The car is to be suspended from the envelope by means of galvanized-wire cables with breaking strength of 2,700 pounds, arranged as shown. The cables are to be fitted with means for adjusting their lengths to equalize the load. The cables are connected to the suspension band by crows'-feet of braided flax, ¾-inch signal halyard stuff, as specified elsewhere. To carry the car when the dirigible is inclined the upper ends of suspension cables are connected by a fore and aft stay.

The suspension cables shall be connected to the car by hooks or bolts arranged to permit ready detachment.



A BRITISH "BLIMP"

Power plant.—The engine shall be a standard Curtiss OXX-3, 100-horsepower aviation engine, or a Hall-Scott A-7-A, 100-horsepower aviation engine.

The air intake opening to carburetor shall be provided with a safety wire gauge sphere of generous size to quench flame in case of backfire.

The motor shall exhaust into an effective muffler at each side, so arranged as to cool the gases and to preclude possibility of flame at exit.

Accessories and repair materials.—With each dirigible the contractor shall deliver the following:

1 ground cloth, 170 by 35 feet.
100 sand bags holding about 40 pounds of sand each.
1 filling balloon or service gas reservoir of 700 cubic feet capacity.
5 screw stakes.
1 extra mooring rope.
200 feet filling tube, 6 inches in diameter, with connecting sleeve.
1 roll of each weight of fabric used.
1 fabric stitcher.
1 fabric roller.
5 gallons of cement.
100 feet of each size wire or cable used.
100 feet of each size rope used.
1 spare gas safety valve, complete.
1 spare maneuver valve, complete.
1 spare gas pressure manometer.
1 set of each size bolts, sheaves, guides, shackles, thimbles, turnbuckles, toggles, or other miscellaneous fittings used—list to be approved by the naval inspector.

Awards of Contracts for "Blimps"

The bids for the "blimps" received by the Navy Department were as follows:

The Curtiss Aeroplane Company, Buffalo, offered to build one machine for $47,000 or four at $40,500 each.

The B. F. Goodrich Company, Akron, Ohio, offered one at $48,000 or two at $41,500 each.

The Connecticut Aircraft Company, New Haven, Conn., offered one at $47,500 or up to eight at $39,000.

The Goodyear Tire and Rubber Company, Akron, Ohio, offered one at $50,000, with prices graduating down for an increased number to $40,000 in excess of eight.

A. R. Knabenshue, New York City, offered one at $71,500.

On March 12, the contracts were awarded as follows with stipulations for deliveries to begin within 120 days:

The Curtiss Aeroplane Company, three "blimps" at $40,750 each.

The Connecticut Aircraft Company, two at $42,000 each.

The Goodyear Tire and Rubber Company nine at $40,000 each.

The B. F. Goodrich Company, two at $41,500 each.

PRESIDENT
LESTER D. GARDNER

THE RUBBER AGE

EDITOR
HERBERT M. WILLIAMS

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THE unprecedented prosperity which during the last few years has forced the rubber industry ahead by giant strides has been due to fundamental causes the effects of which are certain to continue for a long period. The expansion of the areas of planted rubber with the consequent increase in production which is keeping pace with the demand for crude rubber is holding prices steady; the adaptation of reclaimed rubber to new uses is a great conservator. The substitution of rubber for materials which hitherto have cost less to produce, the soaring of prices of practically all other raw materials, the unending demand for tires, and the withdrawal of the Central Powers from purchasing raw materials are some of the factors that have brought to the rubber manufacturer an era unprecedented in expansion and prosperity.

It is because of these facts that THE RUBBER AGE believes that there is an opportunity for serving all interested in the production of rubber, its manufacture, sale and use. It will record accurately and fully twice each month the timely news and progress of the American rubber industry.

The technology of rubber is now becoming so generally known that the secrets of the industry which hitherto have been so highly prized and cautiously guarded are gradually finding their way into print in various parts of the world. It will be one of the main purposes of THE RUBBER AGE to assist in spreading such known technical information as can be obtained from the laboratories and factories, as well as from the technical and engineering press. Looking ahead to the period of possible war and a later period of industrial readjustment, the general opinion of those whose study of the basic conditions entitle their conclusions to weight is that all industry will undergo a pronounced change in the vital principle of cooperation. If the United States is to meet the competition of the world, is to win its share of the world's trade, Industrial America will be forced to adopt new methods and new principles.

It is felt that a special service can be rendered to the rubber manufacturers of the country by keeping them in close and intimate touch with the wholesale buyers of manufactured rubber goods, tires, mechanicals, sundries, footwear, etc. THE RUBBER AGE will do this by printing in a conservative and careful manner such information as will be of value. While the publication will contain much technical information and trade news, the commercial side of the industry will not be neglected, for it is believed that a better and a broader knowledge of the business and commercial problems and market conditions, will be of service to both the manufacturers and those to whom they sell, and will bring about better understandings and more mutual cooperation.

Patriotic Cooperation

There is perhaps no industry in the United States so directly affected by international complications as the rubber trade. With approximately one million Americans dependent upon the continuous operation of rubber factories, everyone who believes that social as well as industrial conditions are determining factors in the happiness and prosperity of our people, must feel a responsibility which should expand his attitude toward the crisis through which the country is passing.

Intense competition has been a boon to the commercial development of rubber in all its phases. A time comes, however, when higher and broader considerations must prevail. When several of the largest rubber companies in the country offered their entire plants, equipment, personnel and financial resources to the Government, they showed the spirit which prompts the true American to place the welfare of the nation above all other considerations.

There are new agencies of the Government now at work in Washington, endeavoring to bring business men into closer contact with national affairs. Conferences are being arranged in order that united action may be assured, not only after the actual commencement of hostilities, but having in view also that cooperation which is so essential in the preparatory stages.

The rubber industry has for its leaders farsighted men who realize that the Government, which supports them in their international transactions, will need their combined skill and resources, and in these troublous times these men can be relied upon to act together, with a unity entitling them to the credit which comes from sacrificing selfish interests for the welfare of the country.

"Blimps"

On another page of this issue of THE RUBBER AGE are given the Navy Department's specifications for "blimps," small dirigibles that in Europe have been found specially effective in night patrol work over cities to give warning of approaching Zeppelins, and in the day time as submarine "spotters." These specifications are of unusual interest to rubber manufacturers, giving, as they do, full details of construction. In time of war, many manufacturers of spread fabrics will doubtless be called upon to make gas bags for large dirigibles, "blimps" and kite balloons. The great demand for rubber goods of all classes by the government in case of international complications should receive serious consideration.

United States Rubber Reports Large Earnings

Net Sales Show an Increase of 36 Per Cent—Net Profits Increase $3,256,295 Over Last Year—Colonel Colt Announces Net Sales for January and February More Than 20 Per Cent Larger Than the Same Months of 1916

The report of the United States Rubber Company and its subsidiaries for the fiscal year ended Dec. 31, 1916, has been issued. It shows net sales of $126,759,000, as against $92,861,000 for the previous year, an increase of $33,898,000, or about 36 per cent. Net profits before deducting interest charges amounted to $14,743,000, compared with $11,486,705 in 1915, an increase of $3,256,295 over the previous year. The surplus after dividends amounted to $5,443,113. These figures compare with $2,882,048 in 1915 and represent a gain of $2,561,065.

Colonel Samuel P. Colt, president, in reviewing the results for the year, calls attention to the fact that it is just a quarter of a century since the United States Rubber Company began business. During this period the growth has been steady. In the last fifteen years the company's business has increased five-fold.

He announces also that the increase in net sales for the first two months of 1917 over the corresponding months of last year was more than 20 per cent.

The Consolidated Income Statement

The consolidated income statement for the year ended Dec. 31 last and for the previous year follows:

	1916	1915
Net sales	$126,759,129	$92,861,016
Operating expenses	110,962,740	79,243,882
Operating profits	$15,796,389	$13,617,134
Other income (net)	2,442,815	193,784
Total income	$18,239,204	$13,810,918
Cash discount customers	2,733,105	1,766,660
Deductions for bad debts	314,444	375,253
Federal income tax	447,882	182,301
Total deductions	3,495,431	2,324,214
Net income prior to interest charges	$14,743,774	$11,486,705
Interest and discount on funded and floating debt	3,517,565	2,790,616
Income for year	$11,226,209	$8,696,089
Income credits applicable prior to 1916	.....	836,971
Balance	$11,226,209	$9,533,060
Income charges applicable prior to 1916	828,013	1,175,480
Net income	$10,398,195	$8,357,580
Dividends	4,955,082	5,475,533
Surplus	$5,443,113	$2,882,048
Previous surplus	22,962,322	20,005,323
Capital gain conversion second preferred into first preferred	73,700	25,000
Adjustment applicable to prior year	.....	49,951
Surplus Dec. 31	$28,479,135	$22,962,322

The Consolidated Balance Sheet

The consolidated balance sheet as of Dec. 31, 1916, follows:

ASSETS

	1916	1915
Property, etc.	$130,187,629	$126,347,931
Inventories	48,530,398	39,768,296
Cash	10,123,709	13,102,408
Notes and loans receivable	1,763,999	1,562,984
Accounts receivable	26,052,707	20,820,334
Securities in treasury	3,481,655	2,272,431
Sinking fund	509,852	476,251
Miscellaneous	1,716,620	2,200,809
Total	$222,366,569	$206,551,443

LIABILITIES

Capital stock	$97,177,200	$96,150,500
Rubber Goods preferred stock outstanding	948,600	1,409,000
Rubber Goods common stock outstanding	43,300	43,300
Canadian Cons.	385,080	490,200
U. S. R. 10-year 6% bonds	16,000,000	16,500,000
General Rubber 5% debentures	9,000,000	9,000,000
Eureka Fire Hose 10-year 5% debentures	970,000	970,000
Canadian Cons 6% collateral trust bonds	2,600,000	2,597,000
Canadian Cons. 5% debentures	2,500,000	2,500,000
Morgan & Wright 5% debentures	5,000,000	3,000,000
Mechanical Rubber—Belt Pk. bonds	737,000	791,000
Notes and loans payable	26,703,866	19,939,709
Acceptances for imported crude rub.	1,891,093	1,135,601
Mdse. accts. pay.	6,526,168	6,111,514
Account interest, taxes, etc.	801,527	491,739
Reserved for dividend	1,223,040	1,200,708
Insurance fund	932,288	809,499
Employes accident fund	368,041	286,110
Reserved for depreciation	5,000,000	5,000,000
Fixed surplus (subsidiary companies)	15,080,231	15,080,231
Surplus	28,479,135	22,962,322
Total	$222,366,569	$206,551,443

Colonel Colt's Report

Colonel Colt, in his report to the stockholders, says:

The most important event of the year has been the funding of the indebtedness of the company and its subsidiaries through the banking house of Kuhn, Loeb & Company. Negotiations to this end were begun some months ago, and but recently consummated. Through the sale of $60,000,000 first and refunding mortgage 5 per cent bonds, the company is now provided with funds wherewith to pay its entire debt and the debts of its subsidiary companies, with the exception of $9,000,000 General Rubber Co. debentures due December 1, 1918, and $2,600,000 Canadian Company bonds, due October 1, 1946.

In addition to the payment of the indebtedness, further working capital is also provided. Bonds of the Canadian Company are not being retired at present through the refunding, inasmuch as they do not mature for nearly 30 years. The debentures of the General Rubber Company are also left undisturbed for the present, as the company has under consideration other plans for dealing with its important crude rubber interests. Provision, however, is made for the issue of additional bonds up to the amount of the capital stock of the company at any time outstanding (at the time of the authorization $97,252,900) to take care of the above named bonded obligations, should it hereafter be found desirable to do so. Provision is further made, under conservative restrictions, for funds for the future growth of the company.

This funding has been carried out in a most thorough manner. While the bankers have been exacting in their requirements, where the security of the bond was involved, they have at the same time shown a breadth and spirit of fairness in the whole transaction, and a desire to have the company unhampered in the economic administration of its business which cannot be too strongly recommended.

To authorize the transaction our stockholders responded to the call for proxies with a unanimity most gratifying to your directors and president, and which I wish to take this opportunity to acknowledge. More than three-quarters of each class of stock (the percentage of the whole being over 82 per cent.) voted in favor of the transaction and no shares voted against it.

With the funding of our debt we will be able to simplify our organization and thereby bring about economies in administration in several ways, among which will be the liquidation of companies whose separate organization is now unnecessary. Steps to this end will be promptly taken.

Our export business, now consolidated under one organization, the United States Rubber Export Company, Ltd., is being successfully pushed forward, although it is still relatively small, being only about 6½ per cent of our total business in 1916 as against 5 per cent in 1915.

Our tire sales for 1916 show an increase of 57.9 per cent over those of 1915.

The development of our rubber plantations in Sumatra has steadily continued during the past year. Our most sanguine expectations from these estates are being realized and it is believed that they will prove to be one of the most valuable assets of the company.

While the profits of the company for 1916 were the largest in its history, the percentage of profits to sales was less than in the previous year, owing chiefly to the advance in materials and labor during the year. With the view of meeting these conditions an advance in prices of manufactured goods, varying from 10 per cent to 20 per cent, was made early this year.

U. S. Rubber Files Big Lien

As a step in the carrying out of the financial plan that involved the authorization of a mortgage securing an issue of $97,252,900 first and refunding mortgage bonds, the United States Rubber Company has filed the mortgage for that amount with the register of deeds in Jersey City, N. J. Of this issue $60,000,000 of the bonds were sold to Kuhn, Loeb & Company.

As a part of the general plan also for refunding the obligations of the United States Rubber Company and of several of its larger subsidiaries, the Rubber Goods Manufacturing Company, created an issue of $27,293,100 first and refunding mortgage bonds, which have been placed as security under the issue of the United States Rubber Company. The Rubber Goods Manufacturing Company has also filed its mortgage for the amount mentioned with the register of deeds in Jersey City.

The Mortgage of the U. S. Rubber Company

The mortgage by the United States Rubber Company covers its plants located in New Brunswick, Jersey City, N. J.; Cambridge, Millville, Chelsea, Uxbridge and Malden, Mass.; Naugatuck, Waterbury, New Haven and Middleburg, Conn.; Providence, R. I.; Mishawaka, Ind.; Bristol, R. I., and Hastings, Mich.; also $2,500,000 preferred and $1,998,000 common of the Bowers Rubber Company; $998,000 of Rubber Regenerating Company, $248,000 of the Naugatuck Chemical Company, $49,000 of the Eureka Hose Manufacturing Company and $9,000 of the Marvel Rubber Company; $21,500,000 face value first refunding mortgage 5 per cent gold bonds of the Rubber Goods Manufacturing Company and $6,900,000 first and refunding mortgage 5 per cent gold bonds of the Canadian Consolidated Rubber Company; also all the stock, being the entire capital stock except directors' qualifying shares of the Adams & Ford Company, American Hand-Sewed Shoe Company, Banigan Rubber Company of Baltimore, Banigan Rubber Company of New York, Boston Rubber Company, Chicago Rubber Company, Chicago Rubber Shoe Company, Continental Caoutche Company, Goodyear India Rubber Selling Company, Duck Brand Company, Interstate Rubber Company, Maryland Rubber Company of Baltimore, William F. Mayo Company, McCord-Norton Shoe Company, Omaha Rubber Company, Pittsburgh Rubber Company, L. P. Ross Company, Springfield Rubber Company, Saint Paul Rubber Company, Sanders Duck and Rubber Company, Standard Rubber Shoe Company, G. E. Thing Company, United States Rubber Company of Delaware, United States Rubber Company of New England, United States Rubber Company of California, United States Rubber Export Company, Limited, and United States Rubber Company, Limited; also $998,000 of the American Rubber Company, $1,248,000 of the Joseph Banigan Rubber Company, $499,800 of the Boston Rubber Shoe Company, $598,000 L. Candee & Company, $498,000 of the Goodyear India Rubber Glove Manufacturing Company, $118,000 of Hastings Wool Boot Company, $398,000 of the Lycoming Rubber Company, $699,000 Mishawaka Woolen Manufacturing Company, $800,000 preferred and $398,000 common of the National India Rubber Company, $298,000 of the New Brunswick Rubber Company $98,000 Shoe Hardware Company and $1,498,000 of the Woonsocket Rubber Company, $10,231,800 preferred and $16,938,000 common of the Rubber Goods Manufacturing Company and $2,731,300 preferred and $2,705,200 common of the Canadian Consolidated Rubber Company, $300,000 preferred of Morgan & Wright, $500,000 of the Hartford Rubber Works, $123,000 of the United States Tire Company and $29,900 of Rubber Regenerating Company.

The mortgage made by the Rubber Goods Manufacturing Company covers its plants lo-

cated in New Brunswick, North Bergen, Stoughton, Mass.; Providence, R. I.; Hartford, Indianapolis, Passaic, N. J.; Newton, Conn.; Chicago, Cleveland and Detroit; also $76,300 of the American Dunlop Tire Company, $50,000 preferred and $49,000 common stock of the Fabric Fire Hose Company, $999,000 stock of Packing Company, $2,499,000 common stock of the G. & J. Tire Company, $199,000 of the India Rubber Company, $149,000 stock of the Mechanical Fabric Company, $1,399,000 of the Mechanical Rubber Company common, $24,000 of the Midgley Manufacturing Company, $199,000 of the Peerless Rubber Manufacturing Company, $34,000 of the Sawyer Belting Company; $99,000 of the Stoughton Rubber Company, $599,000 of the New York Belting & Packing Company, $2,499,000 common stock of Morgan & Wright, $999,000 of the Hartford Rubber Company and $375,000 of the United States Tire Company.

Company Reports All Indicate Prosperity

The Fisk Rubber Co. Earned Net Profits of $1,741,704 in 1916—Lee Tire & Rubber Co. Made $237,337—Ajax Dividends to Be 5 Per Cent—Other Dividends

The Fisk Rubber Co. Annual Meeting

The Fisk Rubber Company has given out a statement of its annual meeting held Feb. 21, from which it appears that it earned net in 1916 $1,741,704, paid $448,000 in dividends and, with dividends paid, increased its surplus from $1,246,394 to $1,875,442. Also, it was stated, the total sales for the fiscal year were $19,457,789.

The following officers and directors were elected, all being re-elected except J. D. Anderson, who is a new addition to the board of directors: President, H. T. Dunn; treasurer and clerk, H. G. Fisk; vice-president, E. B. Broadwell; vice-president, G. A. Ludington; assistant treasurer, R. B. McGaw; controller, E. M. Bogardus; directors, H. T. Dunn of Toledo, Ohio, E. H. Broadwell of Longmeadow, Stedman Buttrick of Boston, J. D. Anderson, H. G. Fisk, G. A. Ludington and Fred T. Ley of Springfield.

The report for the year ending Dec. 31 follows:

	1916	1915 (14 mos.)
Net profits	$1,836,829	$1,791,579
Inventory adjustment	95,125	145,579
Balance	1,741,704	1,646,579
Preferred dividends	448,000	359,041
*Deductions	664,656	660,410
Surplus for period	629,048	627,128

* Expenses in retiring first preferred stock and new financing.

Balance sheet for the year ending Dec. 31:

Assets:

	1916	1915 (14 mos.)
Land, buildings, etc.*	$5,876,308	$4,428,564
Good-will	8,000,000	8,000,000
Investments	†404,312	.....
Inventories	7,514,405	4,571,443
Notes received	3,893,695	1,330,208
Special deposits	1,380,600	.....
Employees' stock collateral	99,835	128,954
Cash	367,089	991,909
Deferred charges	260,478	127,272
Total	$27,796,753	$19,578,352

Liabilities:

Stock:		
First preferred non-convertible	$4,400,000	.....
First preferred convertible	5,000,000	4,775,000
Second preferred convertible	4,500,000	2,000,000
Common	8,000,000	8,000,000
Loans and accounts payable	2,832,293	2,777,649
Accruals, taxes, etc.	37,764	.....
Dividends due	4,485	806
Reserve	171,768	178,501
Stock retirement res.	975,000	600,000
Surplus	1,875,442	1,246,394
Total	$27,796,753	$19,578,352

* Land, buildings, etc., at depreciated value.
† Includes $292,302 company's first preferred stock held for retirement January, 1917.

Report of the Lee Rubber & Tire Corp.

Lee Rubber and Tire Corporation has issued its first annual report for the year ended Dec. 31, 1916, showing a net profit for the year of $237,337, equivalent to $2.37 per share on the 100,000 shares of stock outstanding.

Income account for the year follows:

Net sales		$3,587,761
Cost and expenses		3,340,860
Gross operating profit		246,901
Rentals		4,162
Total		$251,063
Deductions		13,726
Net profit		$237,337
Dividend paid		225,000
Surplus		12,337
Adjusted surplus Jan. 1, 1916		4,058
Surplus Dec. 31, 1916		16,395

Consolidated balance sheet of the company as of Dec. 31, 1916, is presented below:

ASSETS

Cash	$258,560	
Accounts receivable	349,777	
Notes receivable	8,414	
Lee Tire Sales Co., current account	112,312	
Inventories	1,601,442	$2,330,508
Charges deferred		28,540
Investment		500
Plant and equipment		1,206,229
Patents, trade marks, etc.		400,300
Total		$3,966,078

LIABILITIES

Accounts payable and accruals	$75,814	
Notes payable	1,000,000	$1,075,814
Reserves:		
Depreciation of plant and equipment	$191,661	
Adjustment of tire claims	38,633	
Income tax	9,982	240,277
Declared capital, 100,000 shares	$750,000	
Working capital, being cash and actual book value of securities owned in excess of required declared capital	1,883,591	2,633,591
Surplus		16,395
Total		$3,966,078

Albert A. Garthwaite, president, in his remarks to stockholders said:

"The earnings for the first half of the year were satisfactory, but labor troubles together with the great increase in the cost of crude rubber and fabrics used in the manufacturing of our tires and the stationary selling price of our product prevailing during the year caused the falling off in profits during the last six months.

"The additions made during the year of buildings and equipment permit the company to nearly double its manufacturing capacity. The company has also made some changes in the process of its manufacturing and is now producing not only the wrapped tread type of tire but moulded tires.

"The company has taken over the management of its selling department which is now located at the factory. Prior to this year all tires have been sold through an independent selling organization. It is believed that the company will benefit by this change and that its goods will be distributed on a more economical and efficient basis."

Ajax Rubber Dividend

Business of the Ajax Rubber Company and of the Racine Rubber Company, which have been merged, was the largest in January of any month in the history of these concerns.

The dividend on the new stock will be 5 per cent, the same as on the old Ajax stock. At least dividends will be started at that rate, although earnings now would appear to justify a larger disbursement before the end of the year. For the year ended Dec. 31 last net earnings of the two companies aggregated $1,268,311, which is equal to about $9 a share on the new capitalization.

The Racine interests are now represented on the Ajax board by the following: L. R. Patterson, H. L. McClaren, L. T. Vance, Herbert C. Severance, Stuart Webster and Joseph Weissenbach.

Rubber Dividends

The Portage Rubber Co. has declared a quarterly dividend of 1¾ per cent on the preferred and 2½ per cent on the common stock. Preferred is payable April 1 to stock of record March 20, and common May 15 to stock of record May 5.

Kelly-Springfield Tire Co., quarterly of $1.50 per share on 6 per cent preferred, payable April 2, to stock of record March 17.

Rubber Goods Manufacturing Company, regular quarterly of 1¾ per cent on preferred, payable March 15, to stock of record March 10.

Keystone Tire & Rubber Co., declared extra of one-third of 1 per cent, and regular quarterly dividend of 2 per cent on preferred, and regular quarterly dividend of 3 per cent on common stock, all payable April 2, to stock of record March 23.

Federal Rubber, regular quarterly dividend of 1¾ per cent on the first preferred stock payable April 1, to stock of record March 17.

Much More Labor Is Needed In Akron

Immediate Employment Could Be Given to 6000 Men—Special Offers Are Made to Returning Guardsmen

Special Akron Correspondence

Investment of nearly four millions of dollars during the past two years in new plants for the manufacture of rubber products, chiefly tires, and in huge factory additions to present plants has created an enormous demand for labor in Akron, the rubber center of the world. Heads of leading concerns recently announced that there is immediate employment for 6,000 men.

Since the settlement of labor disturbances in rubber circles in 1913, this industry has experienced a growth, unprecedented in its history. New building is constantly in progress, and the result has been that several plants have more than doubled their manufacturing capacities.

Officials of the Firestone Tire & Rubber Company announced recently that plans are afoot to double their plant. Three immense factory additions are now under course of construction at this plant. The Goodyear Tire & Rubber Company is making vast extensions.

Special offers of employment have been extended to Akron members of the National Guard, who will return within a short time from El Paso, Tex., by officials of all leading rubber concerns. Every guardsman will be given a job at good pay. Soldiers from other points also will be given preference at employment bureaus of the rubber concerns.

Many Companies Are Increasing Capitalization

The Rapid Expansion in the Rubber Industry Is Causing Many Manufacturers to Obtain Money to Handle Increasing Business

Akron Companies Increasing Capital

(Special Akron Correspondence)

With the placing on the market during the first week in March of immense issues of common and preferred stock by three of this city's largest rubber manufacturing concerns, a new and greater era of prosperity for Akron is predicted by brokers and rubber men.

March 5, the Cleveland Trust Co. offered $5,000,000 of Firestone preferred stock with a par value of $100. Sale of this stock is the result of financing policy for large extensions, recently adopted by Firestone officials.

Sale of $6,000,000 preferred and $3,370,000 common was recently announced by Goodyear. The Miller Rubber Co. is offering 5,000 shares of common with a par value of $100.

Financing for extensions through stock sales now has reached an aggregate of $14,870,000, most of which will be spent in Akron to increase facilities.

Gordon Co. Increases Stock

Stockholders of the Gordon Rubber Co., Canton, Ohio, have authorized the increase of stock of the concern from $600,000 to $1,600,000.

The million dollar issue will consist of $500,000 preferred and $500,000 common stock. Plant officials said that the increased capitalization was authorized to care for the expansion of the company's business as sales increase.

The company now has under way extensive alterations and enlargements that will double the size of some departments of both the rubber tire and druggists' sundry units. In addition the company recently purchased a tract of land formerly owned by the city along West Creek Park, and within a year work will be started on further plant enlargements there.

The enlargements now under way will be completed within two months and at that time over a hundred additional employes will be put to work.

Double Fabric Tire Co. Reorganized

Double Fabric Tire Company of Indiana has been reorganized as The Double Fabric Tire Company, and its capitalization increased from $10,000 to $900,000, $600,000 of which is common stock. The board of directors consists of A. L. Murray, W. H. Willennar and Simon Straus. Mr. Murray is president and Mr. Willennar is secretary and general manager. The increased capitalization will make it possible for the company to build this spring two additions to its factory which will practically double the floor space. The business is to be confined entirely to tires, inner tubes and tire reinforcements as heretofore.

The Winnsboro Mills Are Enlarging

The Winnsboro Mills, owning a cotton manufacturing plant at Winnsboro, S. C., which is being enlarged and reconstructed, according to press reports, so as to manufacture for the United States Rubber Company a substantial part of its requirements for specialty tire fabrics, have sold to Lee, Higginson & Co. $900,000 of four-year 6 per cent. notes. The total cash cost of the plant alone will be about $1,500,000, and it will be ready to start operations on the new product soon after July 1. The mills will be operated by Lockwood, Greene & Co. of Boston.

Boston Woven Hose Is Increasing Capital

The Boston Woven Hose & Rubber Company is offering to holders of common stock of record March 10, other than trustees of Boston Woven Hose Securities Company, and to record holders of certificates issued by trustees representing such common stock, right to subscribe to one share new common at $100 per share for each two shares now owned. This will increase common stock from $2,000,000 to $3,000,000. Right to subscribe expires April 10, and stock must be paid for on or before April 16, or at the option of the subscriber, one-half on or before April 16 and one-half on Oct. 16.

Treasurer Sprague says:

It is eight years since the stockholders of the company have been asked for any cash for increased capital.

In 1909 the stockholders paid into the treasury $450,000, at which time the common stock was increased to $750,000 and the annual business of the company amounted to a little over $3,000,000. Since that date (1909) the common stock has paid 12 per cent dividends and in addition has been increased to $2,000,000 with surplus of $1,220,116 entirely from earnings. New buildings of reinforced concrete equipped with the latest machinery, including a power plant costing $500,000, have been added to meet the demand of the constantly increasing business and paid for from earnings.

The large increase in the company's sales in 1916, the equally large increase in the present fiscal year beginning Sept. 1, 1916, seems to make probable a business for the current year of $7,000,000, an increase in sales of over $1,000,000 a year in each of the past two years.

Portage Offers $500,000 Worth of Stock

(Special Akron Correspondence)

Sale of $500,000 worth of common stock, now held in the treasury, to stockholders at $100 per share was authorized March 15 by directors of the Portage Rubber Company, a two million dollar concern in Barberton, a suburb of Akron. Each shareholder may purchase the new stock up to one-third of his present holdings.

Proceeds of the stock sale will be applied to factory enlargement, it was announced by W. W. Wildman, general manager. The present capacity of 1,050 per day will be increased to 5,000 casings and as many tubes daily. The firm now employs 600 men. There are 550 shareholders.

Amazon Issues New Stock

(Special Akron Correspondence)

To extend its facilities and make possible a greatly increased output, the Amazon Rubber Co., Akron, O., is offering a new issue of stock—$400,000 of common and $100,000 of 7 per cent preferred, both of $100 par value.

Ravenna Rubber Increases Capital

The Ravenna Rubber Company, Cleveland, Ohio, has increased its capital from $100,000 to $250,000.

Meetings of Rubber Manufacturing Companies

The United States Elects Directors—Goodrich Selects a New Treasurer and Advances W. A. Means to Vice-Presidency—Other Elections

U. S. Rubber Co. Election

The United States Rubber Co. stockholders met on March 20 at New Brunswick, N. J., in annual meeting. The report of the year as published recently was approved and also the purchasing of various companies recently voted.

The eighteen directors were elected and three more added to the board. These were James S. Alexander, president of the National Bank of Commerce of New York; William S. Kies, vice-president of the American International Corporation, and Charles B. Seger, vice-president of the Union Pacific Railroad.

Victor Rubber Co. Doubles Plant

The Victor Rubber Co., Springfield, O., has awarded a contract for additions to its factory which will double the floor space. At the annual meeting of the stockholders, the following board of directors was elected: President, H. H. Durr; treasurer and general manager, F. R. Talbott; secretary, Arthur Sackett; vice president, H. J. Robben; assistant general manager, C. A. Swinehart; Ban Johnson, John L. Bushnell.

Annual Meeting of the Hawkeye

At a recent meeting of the stockholders, the name of the Hawkeye Tire Co., Des Moines, Iowa, was changed to the Hawkeye Tire & Rubber Co. The following directors were elected: John T. Christy, president; John Frederick, vice president; C. B. Hextell, secretary and treasurer; Dr. George McMahon and I. V. Maclean. The output of the factory is reported to be 100 tires and seventy-five tubes per day.

Annual Meeting of The Goodrich Co.

Stockholders of the B. F. Goodrich Company at a special meeting, held March 14, voted in favor of the plan to retire an additional $900,000 of the preferred stock. This leaves the authorized and issued preferred at $26,400,000.

At the meeting of the directors subsequent to the annual stockholders' meeting, the following officers were elected: B. G. Work, president; A. H. Marks, H. E. Raymond, E. C. Shaw, C. B. Raymond and W. A. Means, vice-presidents; G. E. Norwood, secretary and assistant treasurer; L. D. Brown, treasurer; J. C. Lawrence, assistant treasurer. The executive committee consists of the following: B. G. Work, A. H. Marks, H. E. Raymond, E. C. Shaw, C. B. Raymond, W. E. Means, A. B. Jones, L. B. Brown and F. C. Van Cleef were added to the operating committee.

Kelly-Springfield Re-Elects Directors

The Kelly-Springfield Tire Co. directors were re-elected at the annual meeting held March 7. The directors are as follows: Van A. Cartmell, F. A. Seaman, Stephen Peabody, O. R. Cook, A. L. Scheuer, J. Oppenheim, A. M. Poole, and B. Maas.

Murray Heads the National Rubber Co.

James A. Murray has been elected president and general manager of the National Rubber Co., Jeanette, Pa., having resigned his office of vice-president and general manager of the Seamless Rubber Co., New Haven, Conn. He succeeds Jacob G. Feist, who becomes treasurer.

News of the Rubber Industry

Kelly-Springfield Buys the Northland Plant—Perlman Seeks to Restrain Firestone—Goodyear to Grow Cotton—Palmer Develops New Tire—Firestone Has a Mechanical Department

Kelly-Springfield Buys Northland Plant

Kelly-Springfield Tire Company has taken over Northland Rubber Company of Buffalo. The transaction was a cash one, and no new stock will be issued by Kelly-Springfield.

The purchase is due entirely to immediate need of greater capacity. It is expected 500 tires a day will be turned out in the Northland plant by June, and that capacity there will be brought up to 1,000 a day by fall.

Purchase of Northland Company in no-wise interferes with plans for building the immense plant for Kelly Company at Cumberland, Md. Officials know it will take considerable time to complete the Cumberland plant and with pressure of orders on the books an immediate increase in capacity to take care of spring and summer rush was a necessity.

Harry T. Dunn Resigns from Overland

Announcement has been made that Harry T. Dunn has resigned the vice-presidency of the Willys-Overland Company of Toledo, Ohio, to devote his entire attention to the Fisk Rubber Company and The Federal Rubber Company, of both of which he is president. The following statement was given out at Toledo:

At a meeting of the board of directors of the Willys-Overland Company H. T. Dunn, vice-president of that company, resigned, effective May 1, 1917. In a formal statement issued by Mr. Willys he said that due to tremendous increase in business growth and future plans for development in connection with both the Fisk Rubber Company and the Federal Rubber Company, Mr. Dunn, who is president of both, found it necessary to devote practically all of his time to rubber interests. Mr. Dunn, as is well known, has been associated with the Fisk Rubber Company since its inception and has built, developed and perfected the splendid Fisk organization, and the rapid growth of the business during the past few years makes it necessary for him to again take up the reins and give it his undivided attention.

Perlman Seeks to Restrain Firestone

A patent infringement suit has been begun in the United States District Court of New York by the Perlman Rim Corporation, which controls Louis H. Perlman's elementary and foundation rim patent, against the Firestone Tire & Rubber Company, of Akron, Ohio. The plaintiff asks for a perpetual injunction against the defendant and also for a preliminary injunction pending the determination of the suit, for an accounting of profits, assessment of damages and a trebling of the latter amount.

Rapid Expansion of Akron's Tire Industry

Special Akron Correspondence

Statistics compiled by Akron rubber manufacturing concerns show that 11,522,650 tires were produced here in 1916, an increase of 65 per cent over 1915. It is predicted that the production for 1917 will exceed 20,000,000.

Tire manufacturers find it necessary to keep up a program of factory extension work to meet the fast growing output of automobiles. At present, it is claimed that 12,005,000 square feet of floor space is devoted to the tire industry.

Consolidated Rubber Bonds Called

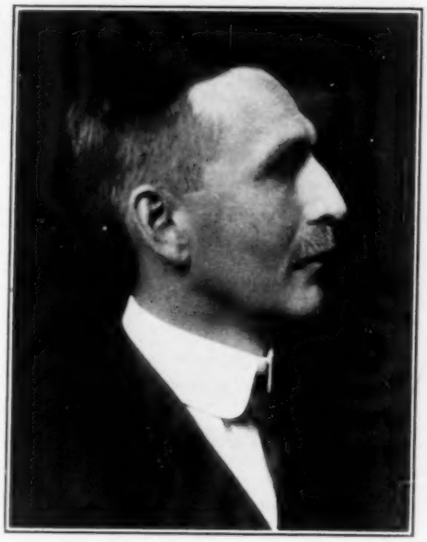
Certain debenture bonds of the Consolidated Rubber Tire Company, dated April 1, 1901, have been called by the Bankers Trust Company for redemption on April 2.

L. D. Brown Is Now Goodrich Treasurer

Special Akron Correspondence

From a job as messenger boy in the Second National Bank to cashier of the First-Second National Bank, the largest institution of its kind in Akron, and now to the treasurership of The B. F. Goodrich Company, marks the achievement of L. D. Brown during twenty-five years. He received the appointment as treasurer of the big rubber concern on February 27.

In the banking business Mr. Brown



Goddard Studio

L. D. Brown

scored a success and established such confidence among his business associates that Goodrich officials found it unnecessary to search among eastern interests for a man to fill the vacancy caused by the election of W. A. Means as vice president.

Mr. Brown is forty-two years old. He was first promoted from his position as messenger boy to a clerical job. Later he became a bookkeeper, then a receiving teller, then paying teller, then assistant cashier and then cashier. He dominated the merger of the Second National Bank and the First National Bank several years ago.

H. L. McClaren Elected Ajax Vice-President

H. L. McClaren, who became a director of the Ajax Rubber Company, Inc., following that company's acquisition of the Racine Rubber Company, of Racine, Wis., has now become vice-president in charge of sales, and will thus have complete oversight of the sales of both the Ajax and Racine products, which are to be marketed separately. Because of his long experience in the tire business and his executive capacity evidenced in the rapid upraising of the Racine business, his activity in handling the affairs of the combined organization was forecast at the time of his direct entrance into its management.

From the early Morgan & Wright activities, into which he entered in 1900, Mr. McClaren has been constantly identified with the manufacture and marketing of tires, becoming vice-president and general manager of the Racine company in 1912, and its president in 1914.

Goodyear to Grow Its Own Cotton

Special Akron Correspondence

The Goodyear Tire & Rubber Company has engaged in the business of growing cotton to entrench its interests against a possible shortage in the supply of this product, which is so vital in rubber manufacture. Goodyear has purchased 8,000 acres of land near Chandler, Ariz., to cultivate this crop.

Word came this week that the entire 8,000 acres are now ready for planting, though development work was started only six weeks ago when the land was a raw desert. To irrigate the crop, 27 wells have been dug to a depth of 40 feet. None but Egyptian long staple cotton will be grown. This is most practical for use in fabrics.

Palmer Develops New Tire

John F. Palmer, Riverside, Ill., inventor of the cord idea in pneumatic tires, has organized a company for the manufacture of his latest development in this type of tire. The factory is at St. Joseph, Mich., has 70,000 sq. ft. area and is of modern construction. The concern is called the Palmer Tire & Rubber Co., and will manufacture the Palmer flat, cable cord tire, a new development of the cord construction. A new tube of Palmer design also will be manufactured. Mr. Palmer's twenty-three years of experience in this field promises interesting construction.

The company is capitalized at $500,000, and the officers are as follows: J. F. Palmer, president; C. W. Bully, Chicago, vice president; W. E. Bryan, Chicago, secretary; M. D. Wilbur, treasurer. G. H. Bird, of the Bird Sykes Co., Chicago, is manager of salesmen.

Death of Edward M. Mundy

Edward M. Mundy, treasurer of the Philadelphia Rubber Works Company, with offices in the Land Title Building, died on March 6 at his home, 4931 Cedar avenue, Philadelphia, from pneumonia. Mr. Mundy was eighty-one years old, and had been treasurer of the company with which he was connected for thirty years. He was a member of Royal Arcanum Acme Council, of Brooklyn. Funeral services were conducted at his late residence by Rev. D. W. Wiley. He was buried on Friday in Greenwood Cemetery, Brooklyn. He is survived by his widow, Mrs. Cornelia Mundy, and a daughter, Mrs. William G. Davis.

Firestone Has a Mechanical Department

Special Akron Correspondence

After confining itself exclusively to the manufacture of solid and pneumatic tires since entering the rubber field, the Firestone Tire & Rubber Company has taken up the manufacture of mechanical rubber goods. Its factory additions have been equipped for the manufacture of rubber footwear, belting, valves, gaskets and mats. Rubber clothing also may be a part of the company's new output.

Aeronautical Departments Are Guarded

Special Akron Correspondence

Heavy guard has been thrown around the aeronautical departments of the Goodyear and Goodrich companies since construction work has begun on dirigible balloons for the United States Navy. Akron recently became the center of manufacture for lighter-than-air fighting machines when local concerns were awarded contracts to build eleven out of sixteen dirigibles ordered by the Navy.

The Gordon Tire & Rubber Election

At a recent meeting of the board of directors of the Gordon Tire & Rubber Co., Canton, Ohio, the following were elected: C. W. Keplinger re-elected president; H. B. McMaster, vice-president and general manager; C. J. Keplinger, secretary and treasurer, and they with Isaac Harter, Henry W. Harter, J. C. Keplinger, G. W. Ake and Samuel Ake form the board of directors.

The management of the concern in anticipation of an expanding business has brought into the organization a number of new operating men as well as sales managers. C. W. McKone, formerly with the Ajax Rubber Co., is now general superintendent; E. R. Neubauer, formerly with the Star Rubber Co., is sales manager of the drug sundry department. A. I. Butler, formerly with the Batavia Rubber Co., is manager of the New York branch; H. R. Platt, formerly with the Batavia Rubber Co., is superintendent of the tire and tube department; E. R. Palmer, formerly with the Mansfield Tire & Rubber Co., is head of the cost department; W. E. Ballsbaugh, formerly with the Star Rubber Co., is superintendent of the drug sundry department.

Engineers to Receive Bids

W. C. Owen & Company, engineers, 1900 Euclid Avenue, Cleveland, Ohio, report handling the following work at this time:

Receiving bids on the motors and equipment for the International India Rubber Corp., new plant at South Bend, Ind.

Will be ready for bids on motors and equipment April 1 for new plant of Pearce Tire & Rubber Company, Ashtabula, Ohio. This plant is being rushed to completion under the direction of R. C. Hatfield, Superintendent for W. C. Owen & Company.

Plans have been completed for a new 300-tires-per-day plant for the A. L. A. Tire Company, 59 E. Elizabeth St., Detroit, Mich. Owners are ready for bids on construction of buildings and equipment.

Plans are being prepared for a new plant for the Akron Biltwell Tire & Rubber Company, Akron, Ohio.

Bids will be received until April 1, for electrical work, plumbing, heating and steam piping for the new plant of the East Palestine Rubber Company, East Palestine, Ohio.

Keaton Plans Factory Branches

R. H. Keaton, president of the Keaton Tire and Rubber Company, has just returned to San Francisco from the Akron factory.

"Our next move," said Mr. Keaton, "will be the establishment of a factory branch in Portland or Seattle to take care of the demand for our tires in the Northwest. Since my return, we have opened a factory branch in Oakland, which now gives us California branches located in San Francisco, Los Angeles and Oakland.

Receiver for Seamless Rubber Co.

Federal Judge Thomas has appointed V. W. Bates receiver for the Seamless Rubber Company of New Haven, Conn. under a bond of $75,000. The company claims assets of nearly $1,000,000. The principal petitioners for the receiver were banks. The company has agreed to the receivership. It was incorporated on March 20, 1887, in Connecticut, and controls the Seamless Rubber Company of New York.

J. K. Williams in Fishing Contests

(Special Akron Correspondence)

J. K. Williams, vice-president of the Mohawk Rubber Co., was host on his yacht, Andria, recently to a fishing party, composed of Akron men, who are executives in rubber concerns. Fishing contests off Florida coasts preceded the entertainment.

Firestone Officials Return to Akron

(Special Akron Correspondence)

R. J. Firestone, vice-president, and F. G. Carkhuff, secretary of the Firestone Tire & Rubber Co., returned March 5 from a seven weeks' tour through the West, making a survey of business conditions.

H. T. West Co. to Remove Its Offices

H. T. West Company, Inc., 113 State Street, Boston, Mass., will remove its offices on April 1 to larger quarters in the new Fidelity Trust Company Building at 148 State Street. This concern has recently purchased a plant in Chelsea for making and storing material

Activities of the Rubber Association

Constitution and By-Laws Amended—The Reclaimers' Club Has Been Merged with the Rubber Association—Meeting of the New Arbitration Committee

Rubber Association Amends Constitution

Amendments to the constitution and by-laws of the Rubber Association of America were adopted at a well attended special meeting held on March 7 in New York. By virtue of these amendments, the board of directors of the executive committee of the association will appoint annually the following standing committees on which all persons connected with firm members in an official or executive capacity will be eligible for appointment, unless otherwise provided.

(a) *A Committee on Nominations*, to consist of five members, who shall prepare and send to each "Firm Member" at least thirty days before the annual meeting a list of persons nominated by them for directors to be voted upon at the annual meeting; but any other members eligible to hold office as provided in Article III may be nominated for election at the annual meeting, provided a written request therefor is received from twenty members and is in the hands of the secretary in time to be sent to each "Firm Member" at least fifteen days before the date of the annual meeting.

(b) *Auditing Committee*, to consist of two members who shall annually audit the accounts of the treasurer.

(c) *Committee on Legislation*, to consist of three members who shall keep in touch with local, State and Federal legislation affecting the rubber industry; to secure copies of bills and report thereon to the executive committee or the board of directors, whenever in its opinion it may deem necessary.

(d) *A Committee on Arbitration*, to consist of seven members, four of whom shall be manufacturers and three crude rubber importers or brokers. The chairman of such committee shall be chosen by the members from their own number for a term of three years, and the term of each of the additional members shall be three years, except that at the time when this committee shall be originally appointed the six members then appointed, other than the chairman, shall decide by lot which of their number shall serve for periods of one, two, and three years respectively, two members of the committee being assigned to each class, and that thereafter two members shall be appointed by the board of directors or by the executive committee in each year. If any vacancies should occur in this committee, such vacancies may be filled by the board of directors or by the executive committee at any regular special meeting.

This committee shall have complete supervision in respect to all matters for arbitration referred to The Rubber Association of America, Inc., and shall make rules and regulations for the conduct and disposition of all matters submitted to arbitration subject to the approval of the board of directors or of the executive committee. It shall provide a form of agreement not inconsistent with existing provisions of law by which, so far as practicable, the decisions of the arbitrator or arbitrators shall be as effective as judgments of the Supreme Court of the State of New York. It shall compile and from time to time revise and keep a list of qualified persons, not less than twenty-five, willing to act as arbitrators under these rules, and who shall be members of The Rubber Association of America, Inc. This list shall be known as "The List of Official Arbitrators of The Rubber Association of America, Inc."

Any matter in controversy may be referred to arbitration by the disputants signing the form of agreement provided by the committee, together with a stipulation to the effect that they will abide by the decision of the arbitrator or arbitrators, selected by the arbitration committee, and waiving any and all rights to withdraw from such submission after the acceptance of their appointment by the arbitrator or arbitrators selected, and designating their selection of either of the two following options:

(1) One of the persons named in said list of official arbitrators, who shall act as sole arbitrator; or

(2) Any two persons named in the said list of official arbitrators to act as arbitrators, who in turn shall designate from the same source a third person to be associated with them as umpire.

The committee on arbitration shall, from time to time, establish a schedule of moderate fees to be paid in all matters submitted, which fee shall be chargeable as decided by the arbitrators.

The secretary of The Rubber Association of America, Inc., shall be the clerk of the committee on arbitration.

(e) *A Banquet Committee*, to consist of three members, who may be associate members.

(f) *An Outing Committee*, to consist of three members, who may be associate members.

Reclaimers' Club Merged with Rubber Ass'n

At the annual meeting of the Rubber Reclaimers' Club, held in New York, it was voted to merge the club with the Rubber Association of America, Inc., of which it will in the future be known as the Rubber Reclaimers' Division.

The organization will continue to be governed by its own by-laws and officials, but will be an integral part of the national body.

At the meeting new by-laws were adopted, and the following officers were elected:

Francis H. Appleton, of F. H. Appleton & Son, Inc., Boston, Mass., chairman; Clark W. Harrison, of the Bloomingdale Rubber Company, 149 Broadway, New York, vice-chairman, and Harry S. Vorhis, secretary and treasurer. An executive committee was chosen composed of the following: John S. Clapp, of the E. H. Clapp Rubber Company, Boston, Mass.; John G. Lowman, of the Philadelphia Rubber Works, Akron, Ohio; Rudolf A. Low, of the United States Rubber Reclaiming Company, 30 East Forty-second street, New York; E. A. Andersen of the Rubber Regenerating Company, Naugatuck Conn., and Joseph F. MacLean, of the Pequannoc Rubber Company, Butler, N. J.

The following new members were admitted: The United States Rubber Reclaiming Company, Inc., the Rubber Regenerating Company and the Philadelphia Rubber Works.

The Arbitration Committee Meets

The following members have been appointed on the new arbitration committee of the Rubber Association: W. W. Ryckman, rubber broker, chairman; W. E. Bruyn, of L. Littlejohn & Company; A. H. Brown, of Meyer & Brown; M. L. Cramer, of the Michelin Tire Company; Horace De Lisser, of the Ajax Rubber Company, Inc.; W. F. Bass, of the General Rubber Company, and R. B. Woodbury, of the Hood Rubber Company.

The arbitration committee met on March 15, and drew by lots those who will serve one, two and three years respectively, according to the by-laws. Lots fell to W. F. Bass and M. L. Cramer, for one year; to Horace De Lisser and A. H. Brown, for two years, and to W. E. Bruyn and R. B. Woodbury, for three years. W. W. Ryckman, chairman, will serve for three years.

Rubber Manufacturing Facilities are Enlarging

New Factories Are Being Built—Many Large Additions for Old Factories—Large Building for Wire Drawing at Hamilton, Ont.

The J. & D. Plant and Organization

The plant of the J. & D. Tire and Rubber Company, Charlotte, N. C., which has recently been completed, is said to be one of the most modern tire factories in the country. The departments are so laid out that additional buildings and equipment can readily be added. The buildings are of concrete and steel completely enclosed by glass on all sides.

Electricity obtained from water power is used to operate the machinery. A battery of two 250 hp. Babcock & Wilcox boilers are used for vulcanizing and heating. The mill line is driven by an electric motor through a Cutler-Hammer electric clutch. The large calender is operated by a 75 hp. motor and a small motor mounted on the calender frame raises and lowers the rolls.

Practically all the piping is run through conduits or trenches thoroughly accessible for repairs.

A motor driven cell drier is used to extract the moisture from the fabric. A Hunter drier, has been installed for the drying of rubber.

Seiberling tire building machines are used. In laying out and designing the mold equipment, the core design is such as to make the core suitable for either clincher or straight side tires, thus reducing the outlay in core equipment.

Harold O. Smith, the president, was one of the founders of the Indianapolis Rubber Company in 1893, and remained with that company until a few years ago. J. & D. in the company's name stands for Jobbers and Dealers.

The officers are as follows: Harold O. Smith, president; Thomas J. Northway, vice president; C. C. Coddington, treasurer, and Lee Folger, secretary. The other directors are Harry S. Leyman, E. Thomason, and D. H. McCollough. George Knowles is superintendent.

Batavia Wants Titan Plant

Efforts are being made at Batavia, N. Y., to secure the plant to be erected by the Titan Tire & Rubber Company, recently organized in New York City. Ashton W. Caney of Batavia is one of the stockholders and organizers and has been made president of the company. The certificate of incorporation filed in the county clerk's office is also signed by Walter J. Kenlon. Harry L. Graff and Harry J. Smith of New York. Clarence L. Weaver of Boston, a former Batavian, is secretary and treasurer. Councilman L. A. Prentice of Batavia is a member of the board of directors, which includes Nicholas Stokes of New York and John P. Noake of Chicago.

Dayton Rubber Soon to Start Plant

Everything is in readiness for commencement of work on the new plant of the Dayton Rubber Manufacturing Company, at Dayton, Ohio. A site of 21½ acres has been purchased, and on it is to be erected a modern plant with a capacity of 3,000 tires a day. The main building is to be 500x150 ft., partly of single-story construction and partly three story. The offices are to be in the second floor of this part, with a recreation hall above.

New Canadian Factory Planned

Acme Tire & Rubber Company will build a plant in Oakville, Ont., for the manufacture of rubber tires and goods.

New Addition for Wire Drawing

In preparation for prosperous times, which the company anticipates will prevail after the close of the war, the Standard Underground Cable Company of Canada, Ltd., is making an addition to its factory at Hamilton, Ont., which when completed and equipped with the necessary machinery will represent an investment of $50,000.

The illustration shows in the foreground this addition with a portion of the former factory in the background to the right, the new part extending about to the point where the car is to be seen standing on the switch. The new structure consists of one story with basement built of brick and concrete and is 125 by 120 feet in dimension, which gives a total increase in floor space of 30,000 sq. ft. It is modern in type and equipped to secure the lighting, heating and ventilation necessary to the best working conditions. Ample fire protection apparatus is also provided, which includes a complete automatic sprinkler system. The architects are Prack & Perrine, of Hamilton.

Addition to Standard Underground Cable Co. of Canada, Ltd., at Hamilton, Ont.

The new building will be devoted exclusively to the uses of the wire drawing department, and in addition to housing the former equipment will contain additions of new machinery of the latest design capable of drawing wires ranging in size from No. 40 B. & S. G., to the largest size of trolley wire; also machines for grooving trolley wire and for rolling flats and squares such as are used in the manufacture of magnet wire. There will also be two new Bright annealing furnaces for annealing or softening the wire after it has been drawn. This addition will not only give room for a considerable increase in the output of the wire drawing department, but the space released will allow for expansions in the stranding and cabling departments.

All of the machinery in the new plant will be electrically operated by 3-phase alternating current motors of 550 volts, 25 cycles.

Dowse Organizing a Rubber Company

The organization of a new rubber and tire interest by Byron C. Dowse, former president of the Federal Rubber Manufacturing Company, Milwaukee and Cudahy, Wis., is reported. It is stated that Mr. Dowse is forming the Dowse Rubber Company of Illinois. He formerly was one of the owners of the G. & J. Rubber Company, Indianapolis.

W. C. Laderer to Start Rubber Factory

W. C. Laderer of Evans City, Pa., president and general manager of the W. C. Laderer Carriage company operating large carriage factories in Zelienople, has decided to discontinue manufacturing horse drawn vehicles.

With the opening of the spring Mr. Laderer will begin construction of additions to his present large plant at Zelienople, which will be devoted exclusively to the manufacture of rubber electrician gloves. The company will be known as the W. C. Laderer Rubber Products Co., with factories and main offices at Zelienople and large distributing branches in New York, Chicago and San Francisco.

The Standard Four Is Building Addition

The Standard Four Tire Co., Keokuk, Iowa, has recently added a night force. The company is now building an addition to its factory, which it expects to occupy by May. Orders have been placed for additional machinery, which will be received and installed during the coming summer. Its capital was recently increased from $240,000.00 to $650,000.00.

American Rubber & Tire Enlarging Plant

American Rubber & Tire Co., Akron, Ohio, is constructing an addition to its plant. The new building will be 108x40 ft., and four stories high. With the enlarged facilities it is said that the company will double its output. The capitalization of the company has been increased from $500,000 to $1,000,000.

New Building for Lycoming Rubber Co.

C. R. Haynes, general superintendent of the Lycoming Rubber Company, Williamsport, Pa., has announced that the company would erect a five-story building of brick construction to cost approximately $100,000.

Building Addition to Shipping Department

In order that shipments may be handled as efficiently as possible, the Pennsylvania Rubber Company, Jeanette, Pa., is building an addition to its shipping department. The building will double the present capacity, and will be ready within a few months.

Hygienic Rubber Co. Enlarges Plant

The Hygienic Rubber Company, Muskegon, Mich., has recently enlarged its plant and equipped it with new machines purchased from the Adamson Machine Company, Akron, Ohio.

The Federal Plans Addition

The Federal Rubber Mfg. Co., Cudahy, Wis., plans an addition to its power house costing $200,000. H. M. Hope, 185 Devonshire street, Boston, is engineer.

Business, Personal and Social Activities

Ajax Moves Into New Factory—Devine Ships Driers Abroad—I. R. Bailey Celebrates Anniversary—Musical and Social Factory Doings

Ajax Has Moved Into New Factory

The Ajax Rubber Company, Trenton, N. J., has moved into its new plant. When all the machinery is installed the enlarged establishment will have a capacity for turning out 3400 tires a day, according to reports. The company will run three continuous shifts of men, work its plant day and night, including Saturdays.

The Firestone Social Activities

Special Akron Correspondence

The Firestone Company recently completed a clubhouse for its employes. The building is equipped with an auditorium, dance hall, dining rooms for office and factory employes, rest rooms, barber-shop and swimming pool. Meals are served at cost.

The Firestone Orchestra recently was formed. It will accompany the Firestone Glee Club in a series of concerts during the next three months in Akron and vicinity. "The Firestone Follies of 1917" was a pretentious amateur theatrical production given recently at the clubhouse by employes.

J. P. Devine Co. Ships Driers Abroad

The J. P. Devine Company, Buffalo, N. Y., has recently shipped units of the Devine High Efficiency Vacuum Chamber Driers to Congo, East Africa, and to Java as well as to South America.

The Goodyear Minstrels

Special Akron Correspondence

It was not necessary to search outside the factory of the Goodyear Tire & Rubber Company for enough amateur theatrical talent to organize the Goodyear Minstrels this month. Seventy-five persons, all Goodyear employes, make up the company. Successful performances were given. Arthur Dunlevy scored a success as interlocutor. End men are Joseph Ebner, Frank Falor, C. R. Neal, J. E. Jordan, L. H. Whittaker, C. L. Lucas, George Dunlevy, S. G. Urbaugh, Stanley Davies and N. F. Staley.

Pearce Factory Will Operate About July 1

The new factory of the Pearce Tire & Rubber Company, Ashtabula, Ohio, will be in operation about July 1. The capital of the company is $100,000 to be increased later on. The officers are as follows: A. E. Pearce, president; J. J. Atwood, secretary and treasurer. Directors: A. E. Pearce, E. J. Anderson, Charles L. Foster, W. E. Wilkins, and F. E. Myers.

I. R. Bailey Receives Silver Service

(Special Akron Correspondence)

I. R. Bailey, sales manager of the mechanical goods department of the Goodyear Tire & Rubber Co., upon his return recently from a western trip, was presented with a silver service set by the men of his department.

Dayton Rubber Co. to Erect Factory

The Dayton Rubber Company, Dayton, Ohio, plans to erect a new factory on twenty-one acres recently purchased. The new plant will have accommodation for the employment of 1,000 men.

New American Patents

ISSUED MARCH 6, 1917.

1,218,100—To Joseph Mathey, Omaha, Nebr. Steam Vulcanizer.

1,218,101—To Joseph Mathey, Omaha, Nebr. Steam Vulcanizer.

1,218,119—To John A. Robertson, Richmond, Va. Assignor of one-half to Wurt A. Martin, Richmond, Va. Tire Gage.

1,218,155—John F. Zimmerman, Akron, Ohio. Machine for Painting Tire Castings.

1,218,245—Emil Draver, Richmond, Va. Vulcanizing Tool.

1,218,261—Harry Hunter, Indianapolis, Ind., assignor to The Hunter Dry Kiln Co., Indianapolis, Ind. Process of Treating Rubber.

1,218,332—Herman Sterm, Munich, Germany, Manufacture of Diolefins (Isoprene), Caoutchouc, and Caoutchouc-like Substances.

1,218,431—To Alexander V. McCrimmon, Beatrice, Neb. Armor for Pneumatic Tires.

1,218,441—To John Michael, Philadelphia, Pa. Vulcanizer.

1,218,459—To John C. Price, Wevco, W. Va. Tire Grinding and Truing Machine.

1,218,486—To Edward Sterns, St. Louis, Mo., assignor to Efficiency Oil Corporation, Wilmington, Del. Vehicle Tire.

1,218,548—To Jesse S. Green, Franklin, Pa. Vehicle Tire.

1,218,568—To William Oscar Kennington, Anderson, Ind., assignor to Remy Electric Company, Anderson, Ind. Article Composed Partly of Rubber or the Like.

1,218,596—To Oliver Frances Conklin, Anderson, Ind., assignor to Remy Electric Company, Anderson, Ind. Article composed Partly of Rubber or the Like.

ISSUED MARCH 13, 1917.

1,218,627—To Ferdinand Francis Brucker, Akron, Ohio, assignor to The Miller Rubber Co., Akron, Ohio. Tire-Stitching Machine.

1,218,641—To Harry E. Fry, New York, N. Y. Mold for Rubber Articles.

1,218,657—To George L. Hemmelberger, Reading, Pa. Anti-Skid Device for Vehicle Wheels.

1,218,713—To Herman Stern, Germany. Production of Caoutchouc-Like Bodies.

1,218,763—To Frank H. Grove, Columbiana, Ohio. Web-Tensioning Device for tire-making machines.

1,218,852—To Blanche R. Gilpin, Tyger Valley, Idaho. Toy.

1,218,881—To Victor C. McLain, East Moline, Ill. Tire-Rim Setter.

1,218,948—To Daniel R. Markley, Lancaster, Pa. Eraser Attachment for Fountain Pens.

1,218,949—To E. A. Meyer, Detroit, Mich., assignor to Morgan & Wright. Process of Treating Rubber.

1,218,983—To Myron H. Clark, Malden, Mass., assignor to The Goodyear's Metallic Rubber Shoe Co. Machine for making Rubber Goods.

1,219,033—To Levi S. O'Dell, Forestville, N. Y. Puncture Proof Layer for Tires.

1,219,088—To Howard C. Davis, Cambridge, Ohio. Tire Chain.

1,219,163—John Baurke Salmon, Dunedin, New Zealand. Process of Manufacturing Pneumatic Tires.

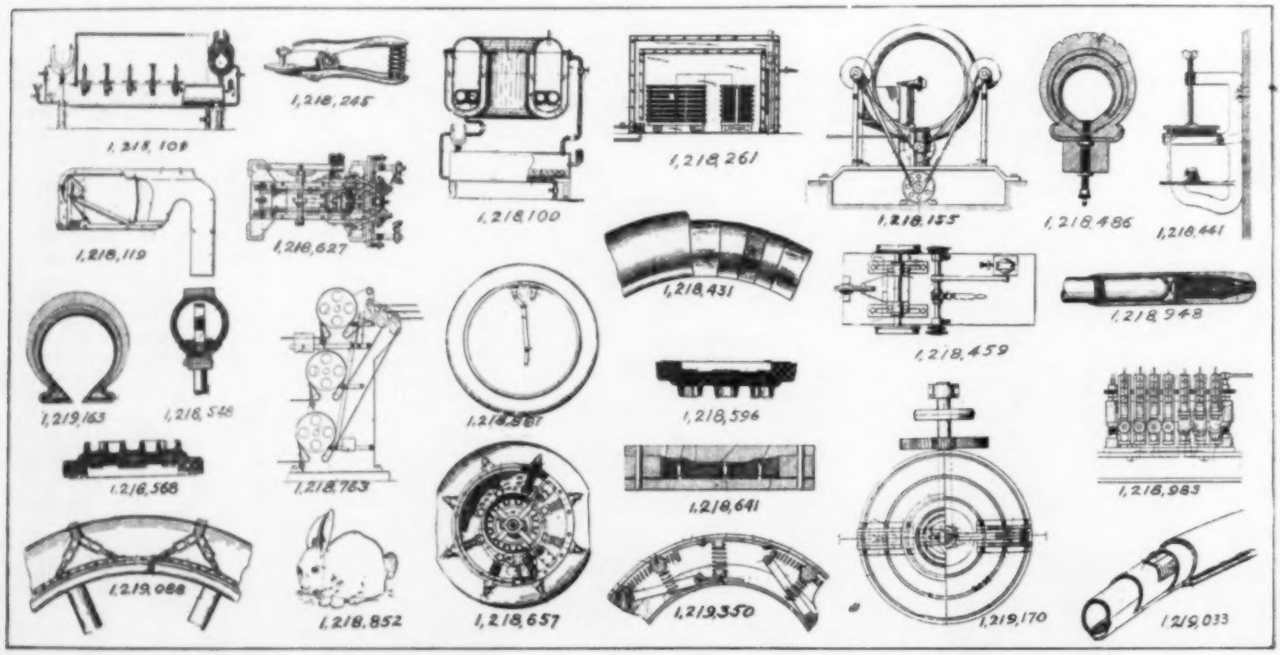
1,219,170—To Frank J. Schumann, Cleveland, Ohio, assignor to The Standard Welding Co., Cleveland, Ohio. Machine for Punching and setting tires.

1,219,349—To Lauritz Peterson-Hvild, Copenhagen, Denmark. Method of Impregnating Fabrics.

1,219,350—To William C. Post, Brewster, Minn. Tire.

1,219,351—To Fred Thomas Roberts, Cleveland, Ohio. Process of an apparatus for making hollow rubber articles.

1,219,397—To Chas. E. Hershey, Mechanicsburg, Pa. Anti-Skidding Device for use on Automobile Wheels.



Market of Manufactured Rubber Goods

The stability of business and the fact that future conditions have been discounted are evidenced by the steady markets. The threatened railroad strike, the sinking of American ships and the dispatching of armed merchantmen with Naval gun crews have not seemingly influenced the orders for rubber goods.

It is one of the striking signs of these remarkable times that in spite of all obstacles, business continues in undiminished volume. The high cost of raw materials, of living and of labor, fail to arrest our manufacturing and commercial activities. The rubber industry is no exception and is experiencing unprecedented prosperity and expansion in all of its branches.

TIRES

The tire trade is especially busy and is full of optimism in spite of the steady increase in the cost of materials, labor and general overhead expenses. The difficulties which have caused one general readjustment of tire prices this year, and a second one by two concerns, are by no means at an end and it seems probable that other manufacturers will have to "tune up" their prices to the cost of production.

Special Akron Correspondence

Prices of automobile tires, notwithstanding the fact that they have climbed in pace with hundreds of other commodities, are expected soon to mount another notch. Though none of the leading rubber companies in Akron will say when the increase will be made or how much it will be, it is generally admitted that trade waters soon will be muddled up considerably with higher prices.

Consistent with its fair list price policy and frankness with dealers and consumers, The B. F. Goodrich Company maintains no close secrecy in price affairs. On March 1 Goodrich announced and placed in effect an increase which amounted to approximately 4 per cent. Along with nearly every other tire manufacturing concern, it will be remembered, that this company announced a 10 per cent increase Jan. 1.

Other prominent rubber companies refused at this writing to discuss probable increases, though one high official of one of the largest manufacturers said price raises were under discussion. It is considered probable that increases will be announced soon.

The "why" of higher tire prices has two answers—labor and fabric. Fabric prices have jumped 125 per cent during the past year and labor is costing 25 to 50 per cent more. Rubber tubes have not increased proportionately with tire casings because fabric is not a factor in their manufacture.

The labor problem for rubber concerns is growing more and more complex. Employment bureaus declare that 6,000 men could be used in Akron immediately. That many more will be needed when construction work, now under way, is completed.

Owing to these conditions rubber concerns have wholly discontinued the making of time contracts with dealers on job lots. Tires may be obtained at the market price on the date of delivery. Prices to all car owners are "subject change without notice."

In announcing its March increase in prices The B. F. Goodrich Company in a circular letter said: "In accord with our announced policy that, during the period of prevailing uncertainty, we would only advance prices to consumers and dealers by such moderate moves as the cost conditions imperatively demand, we herewith announce a further increase in our prices." Silvertown cord casings remain unchanged.

MECHANICAL GOODS

Business in mechanical goods, while far more active than in preceding years, has slackened on the sales end, but not so in manufacturing for the orders in hand are generally sufficient to keep the factories working at full capacity for some time to come. The increasing cost of everything that enters into these goods is gradually forcing upward the prices of mechanical rubber goods. Higher levels are predicted before the end of the season.

FOOTWEAR

Rubber footwear manufacturers are exceedingly busy and have difficulty in securing sufficient skilled labor to handle the unusually large orders they have in hand, chiefly for overshoes and tennis shoes. Trade authorities believe that fabric footwear with rubber and fiber soles will have an unprecedented vogue this summer on account of the high and still increasing price of leather.

Rubber soles and heels and fiber soles are being adopted by many shoe manufacturers. The energy that is being devoted to the development of moderate priced fiber soles is perhaps the most striking feature of the rubber industry today.

DRUGGISTS' SUNDRIES

Like all other lines of rubber goods, druggists' sundries are harder to turn out in sufficient quantities than they are to sell. Skilled labor is the greatest problem druggists' sundries manufacturers have to contend with but it has not prevented their breaking all records of production.

Bathing caps are being manufactured in enormous quantities. Dipped goods are also in great demand and the number of concerns now taking up these lines indicate that they are inviting.

The Fabrics Market

The raw cotton market maintained a steady tone in spite of the continued uncertainty of international and shipping conditions, although the railroad labor situation, the sinking of American ships and the Russian revolution have served in some measure to confuse sentiment. A four per cent increase in the East Indian import duty on cotton has disturbed the Lancashire spinners, but the new duty is not likely to be removed, and its effect will likely not only prove harmful to Lancaster, but will also probably hurt the American cotton grower.

Ocean freights and the cost of insurance against war risks are both higher than ever before, and exports are reported to have been small. It may be, however, that the exports were larger than generally supposed, for it is known that the United States Government is at present withholding much information regarding shipping news.

EGYPTIAN COTTON

Alexandria advices mention complaints as to bad quality of Egyptian cotton seed for sowing purposes; last year's heavy boll worm attacks affected the quality considerably. The Liverpool Cotton Exchange has been informed by the British Foreign Office that, in order to save tonnage, the Government has decided to prohibit, except under license, the exportation of all raw cotton from the United Kingdom. For ten weeks ending March 8 the exportation of raw cotton from Great Britain amounted to 99,833 bales, of which 67,374 bales were Egyptian grown.

The result of the British embargo, as far as America is concerned, will be a reduction of imports of Egyptian cotton. Much of the $28,000,000 of the Egyptian staple bought by Americans in 1916 came through Liverpool. Officials in Washington intimate that the British order will inconvenience Americans only for a time, as shipments soon will be started direct from Egypt.

Though Egyptian cotton is used extensively in the manufacture of automobile tires, much of it can be replaced by the somewhat more expensive Sea Island.

SEA ISLAND COTTON

Firmness has been the feature in the Savannah and Charleston markets since the break at the beginning of last month, and old crop holders in the South appear full of confidence. It is still too early for weather to exercise decisive influence on these markets, but reports of delayed germination and other drawbacks are probably strengthening the holding movement. Favorable crop progress and continued curtailment of exports would probably make Southern holders easier to deal with durjng the coming Spring and Summer. For the moment, however, there is no pressure on the market from that source. Large holders of Sea Island cotton in Savannah have in fact been buyers instead of sellers. Hope is expressed by the mill representatives that Texas will produce a crop that will be a good substitute for Sea Island cotton for tire making, though rumors of an injurious drought in the cotton districts of that State are heard.

YARNS

The tone of the cotton yarn market is firm and advances are noted in many numbers. Sellers report that the rising cotton has driven many buyers into the market to cover requirements before further increases in yarn prices are made. Dealers generally express belief that such action is wise on the part of the buyers. They intimate that prices will probably go still higher.

Boston reports that tire cloth manufacturers have been the largest class of buyers, their purchases being stimulated by the increasing scarcity of staple cottons and advancing prices of the same. Spot supplies of Egyptian, Sea Island and peeler cotton have rarely been so depleted at this season, but the majority of spinners are well covered. Combed yarns have been in particularly good demand.

FABRICS

Uncertainty which has dominated the situation for some time past is still in evidence and there is no apparent likelihood of its clearing up. Business in staple cotton goods is quiet, but the strength of cotton futures and yarns keeps prices firm, with general tendency toward higher levels.

TIRE FABRICS

The reported British restrictions upon shipments of Egyptian cotton caused a sharp advance in tire fabrics made of this grade of staple, which was followed by sympathetic advances in fabrics made of other cottons. This tendency has not caused any extensive buying.

With regard to the possible shortage of

long staple cottons, the general opinion is that combed peelers, especially of Texas grown cotton will furnish an acceptable substitute.

HOSE AND BELTING FABRICS

The demand for mechanical goods for Government requirements is large and prices for fabrics used in the making of these goods are firm. Good orders are being written ahead.

DRILLS, SHEETINGS AND OSNABURGS

Prices for these are firm with a marked upward tendency. Orders are coming in steadily; some of them, exceptionally large, being for Government contracts.

GARMENT CLOTH

The wool market has been quiet, chiefly because of scant offerings. There has been little inclination to do business at prices any less than have been received. The trade is confident of the strength of the situation. Contracts are being placed at prices that are extremely high when compared with those prevailing prior to the war, but the question of what is or is not "high" is a relative term which only time can determine accurately.

Woolen fabrics of domestic manufacture are advancing and some complaints are heard of slow deliveries.

Imported fabrics are coming in regularly; prices, however, showing an increase of from 40 to 50 per cent over the figures of a few months ago. Opinion is expressed that they will go even higher.

NEW YORK QUOTATIONS

TIRE FABRICS

17¼-ounce Sea Island, combed...sq. yd.	$1.35
17¼-ounce Egyptian, combed.....	1.25
17¼-ounce Egyptian, carded.....	1.22
17¼-ounce Peelers, combed.....	.90
17¼-ounce Peelers, carded.....	.70

American carded Staple .46-47, pound basis.

MECHANICAL DUCKS

Hose	lb.	.36
Belting		.35

SHEETINGS

40-inch	2.35.....yard	.13½
40-inch	2.50.....	.13
40-inch	2.85.....	.11¼
40-inch	3.00.....	.11
40-inch	3.15.....	.12
40-inch	3.25.....	.10
40-inch	3.60.....	.10¼
40-inch	3.75.....	.09¼
40-inch	4.25.....	.08

OSNABURGS

40-inch	2.25-yard clean cotton.....	.13½
40-inch	2.25-yard part waste.....	.12½

DRILLS FOR PROOFING

37-inch	2.35.....yard	.15¼
37-inch	2.75.....	.12½
37-inch	3.00.....	.10¾
37-inch	3.25.....	.10¼
37-inch	3.50.....	.09¾
37-inch	3.95.....	.09

TWILLS FOR PROOFING

37-inch	2.85.....yard	.13
37-inch	2.35.....yard	.15¼
37-inch	2.10.....yard	.16

BURLAPS
(Carload lots)

40-inch	7½-ounce .....per 100 yards.	$7.40
40-inch	8 -ounce	7.50
40-inch	10 -ounce	8.40
40-inch	10½-ounce	8.50

Chemicals and Compounding Materials.

The freight congestion was largely responsible for the firm undertone which prevailed in the market for heavy chemicals. With but few exceptions dealers are finding it difficult to make deliveries on time, thus causing much inconvenience to manufacturers. Spot stocks are comparatively light and the delay occasioned by the freight situation tends to develop a very irregular market. Interest centered in the uplift in the market for crude sulphur. The demand for this material from various sources has been unusually heavy and with the cost of the labor high the advance was not unexpected. This was followed by a general uplift in the quotations for refined sulphur. Antimony salts were strong on the spot, reflecting the strength in the metal. Zinc oxide was easier but white lead was firmly maintained. Large producers of magnesia are said to be well sold up and prices are mostly normal. In regard to colors the situation is still very strong where the higher grades are concerned. Naphthas were strong in sympathy with the firm position of crude oil.

SULPHUR

Leading producers advanced the price of brimstone to $45 per ton. It is reported that producers are heavily sold up and they do not appear anxious to take on new business calling for prompt or nearby shipment. The advance in brimstone caused manufacturers to announce a general advance of 25c per 100 lbs. in refined sulphur, establishing a basis of $2.35 @ $2.75 per 100 lbs. for flour, in barrels. Sulphur roll was quoted at $2.20 @ $2.50 per 100 lbs.

ANTIMONY

The metal for spot delivery held at 31 @ 32c, but on forward contracts 17 @ 18c could have been done. This strength in spot antimony had a tendency to uphold prices for the sulphide. Antimony needle was quoted firm at 18 @ 20c per lb. Golden sulphide was quoted at 25 @ 30c per lb.

ANILINE OIL

Spot prices were firmer under increased demand. Sales were noted at 30c per lb. Prices, however, covered a range of from 28c to 30c per lb. at the close, according to seller and quality.

BENZOL

Large contracts were closed recently and the market was firmly maintained at 55 @ 60c per gal. Contract business went through on the 55c basis, bulk, f.o.b. works. Solvent naphtha was quoted by producers at 20 @ 25c per gal., prompt shipment.

NAPHTHA

In view of the firm position of crude oil the market for naphthas was strong and higher. The demand has been heavy, both in an export and domestic way. For the 86 degs. the market closed at 41c per gal., with the 70 @ 72 degs. at 33c per gallon, in steel drums.

ZINC OXIDE

With spelter dull and easy the market for zinc oxide was not so firm. American process zinc oxide was quoted by producers on the basis of 9¾c per lb., for 50-ton lots, delivery over the first half of 1917. For car-lots, 9⅞c was quoted. French process, for delivery over the second quarter of 1917, was quoted on the basis of 15 @ 15¼c per lb. for the red seal.

LITHOPONE

The market is firm under a steady demand. On contract lots some sellers quoted 6¼c per lb., with smaller quantities held at 6½ @6¾c. Imported lithopone was held @ 7½c per lb.

LITHARGE

Sellers are reported well sold up and the market is firm. Prices ranged from 9¼c to 9¾c per lb., with several handlers unwilling to take on business at the inside figure. The firm position of basic materials tends to strengthen the market.

Prices Current for Chemicals, Fillers, Colors, etc.

Acetone	lb.	.22½	@	.23
Acids, Acetic, 28%	lb.	.03½	@	.04½
Carbolic, C. P.	lb.	.44	@	.45
Cresylic, 95%	gal.	.80	@	.90
Muriatic, 20 deg.	lb.	.01¾	@	.02
Muriatic, 22 deg.	lb.	.02	@	.02½
Nitric, 36 deg.	lb.	.05¾	@	.06
Nitric, 40 deg.	lb.	.06¼	@	.06½
Sulphuric, 60 deg.	lb.	.01	@	.01½
Tartaric, crystals.	lb.	.75	@	.78
Aniline oil	lb.	.28	@	.30
Antimony, metal, spot	lb.	.31	@	.32
Sulphide, black	lb.	.18	@	.22
Sulphide, golden	lb.	.25	@	.30
Sulphide, crimson	lb.	.52	@	.58
Asbestos	ton	22.00	@	45.00
Asphaltum, Egyptian	lb.	.20	@	.25
Domestic	ton	18.00	@	25.00
Barium sulphate, technical	lb.	.04¾	@	.05¾
Chloride	lb.	.05	@	.05½
Barytes, prime white imported	ton	38.00	@	40.00
white, domestic	ton	30.00	@	32.00
off color, domestic	ton	25.00	@	27.00
Benzol, pure	gal.	.55	@	.60
Beta-napthal, sublimed	lb.	.85	@	.90
unsublimed	lb.	.80	@	.85
Blacks, Drop	lb.	.07	@	.12
Ivory	lb.	.16	@	.30
Carbon gas	lb.	.22	@	.32
Lampblack	lb.	.14	@	.20
Mineral blacks	ton	20.00	@	30.00
Blues, Prussian	lb.	.85	@	1.50
Soluble	lb.	1.50	@	2.00
Ultramarine	lb.	.20	@	.40
Browns, Sienna, Italian, burnt and powdered	lb.	.05½	@	.10
burnt, lump	lb.	.04	@	.06
American, burnt and powdered	lb.	.02	@	.03
Umber, Turkey, burnt, powdered	lb.	.04	@	.05
American, burnt	lb.	.02¾	@	.03
Cadmium sulphide, yellow	lb.	3.70	@	3.80
Carbon bisulphide, bulk	lb.	.05½	@	.06½
tetrachloride, drums	lb.	.16½	@	.17½
Caustic soda, 76 @ 78%	lb.	.04⅝	@	.04⅝
Chalk, precipitated, light	lb.	.04½	@	.04¾
heavy	lb.	.03¾	@	.04¼
China clay, domestic	ton	20.00	@	25.00
imported	ton	30.00	@	40.00
Fossil flour	lb.	.05	@	.10
Gilsonite	ton	40.00	@	45.00
Glue, extra white	lb.	.30	@	.40
medium	lb.	.23	@	.25
low grade	lb.	.20	@	.22
Glycerine, C. P. (drums)	lb.	.55	@	.56
Graphite, flake (bbl.)	lb.	.25	@	—
powdered (bbl.)	lb.	.10	@	—
Green, chrome	lb.	.32	@	.50
Ground glass (fine)	lb.	.02½	@	—
Hexamethylenamine	lb.	.60	@	.65
Indian red, standard	lb.	.08	@	.10
Infusorial earth, powd'd.	ton	60.00	@	—
bolted	ton	70.00	@	—
Iron oxide, red, reduced grades	lb.	.04	@	.05
red, pure, bright	lb.	.12	@	.14
Lead, red oxide of	lb.	.10½	@	—
sublimed blue	lb.	.08¾	@	.09
white, basic carbonate	lb.	.09¼	@	—
white, basic sulphate	lb.	.08¾	@	—
Lime, flour	lb.	.01¼	@	.01½
Litharge	lb.	.09½	@	—
English	lb.	.11	@	.12
sublimed	lb.	.09¼	@	.09¾
Lithopone, domestic	lb.	.06¼	@	.06¾
Magnesia, carbonate	lb.	.14	@	.16
calcined, light	lb.	.65	@	.75
Magnesite, calcined, pwd.	ton	40.00	@	—
Mica, powdered	lb.	.03¾	@	.05
Mineral rubber	lb.	.01	@	.02½
Naphtha, motor gasolene (steel bbls.)	gal.	.24	@	—
68 @ 70 degrees (steel bbls.)	gal.	.30	@	—
70 @ 72 degrees (steel bbls.)	gal.	.31	@	—
73 @ 76 degrees (steel bbls.)	gal.	.33	@	—
machine (wood bbls.)	gal.	.41	@	—
Oil, corn, refined	cwt.	13.26	@	—
linseed (bbl.)	gal.	1.00	@	1.01
palm	lb.	.12½	@	.13
pine	gal.	.65	@	—
rapeseed, refined	gal.	1.10	@	1.15
rapeseed, blown	gal.	1.15	@	1.20
rosin, first rectified	gal.	.38	@	.40
tar (commercial)	gal.	.22	@	—
Orange mineral, American	lb.	.12½	@	.13½
imported	lb.	.16	@	.20
Petrolatum, bbls., amber	lb.	.04	@	.04½
pale yellow	lb.	.04½	@	.04¾
Pine tar	bbl.	9.50	@	10.00
Pitch	bbl.	4.25	@	4.75
Plaster of paris	lb.	1.50	@	1.70
Rosin (common to good), @ 280 lbs.	bbl.	6.00	@	6.10
Rotten stone, powdered	lb.	.02½	@	.04
Rubber substitute, black	lb.	.09½	@	.12½
white	lb.	.14	@	.18
brown	lb.	.13	@	.17
Shellac, fine orange	lb.	.55	@	.56
T. N.	lb.	.52	@	.53
bleached, commercial	lb.	.51	@	.52

Silex (silica)	ton	24.00	@ 34.00
Soapstone, powdered	ton	14.00	@ 20.00
Starch, corn, powdered	lb.	.03¾	@ .04½
Sulphur, crude	ton	45.00	@ —
Sulphur, roll, per 100 lbs. in	bbls.	2.20	@ 2.50
flour		2.35	@ 2.75
flowers		2.55	@ 2.95
Talc, American	ton	14.00	@ 18.00
French	lb.	.15	@ .22
Toluol, pure	gal.	1.75	@ 2.00
Tripolite earth	ton	60.00	@ 65.00
Turpentine, pure gum spirits	gal.	.48	@ .50
wood	gal.	.45	@ .46
Venice, artificial	gal.	.11	@ .12
Vermilion, Chinese	lb.	2.50	@ 2.75
English	lb.	2.25	@ 2.50
Wax, beeswax, crude yel.	lb.	.43	@ .45
ceresin, white	lb.	.18	@ .22
carnauba, No. 1	lb.	.48	@ .50
ozokerite, black	lb.	*.60	@ .70
green	lb.	*.80	@ .90
montan	lb.	.30	@ —
paraffin, refined 118/120 m. p. (cases)	lb.	.07	@ .07½
123/125 m. p. (cases)	lb.	.07¾	@ .08
128/130 m. p. (cases)	lb.	.08½	@ .09
133/136 m. p. (cases)	lb.	.09½	@ .10
crude, white, 117/119 m. p. (bbls.)	lb.	.06½	@ .06¾
yellow, 124/126 m. p. (bbls.)	lb.	.06¾	@ .07
Whiting, commercial	cwt.	.95	@ 1.10
Paris, white, American	cwt.	1.25	@ —
English cliffstone	cwt.	1.50	@ —
Yellow ochre	lb.	.03	@ .05
chrome, c. p.	lb.	.24	@ .28
Zinc oxide, American process, horsehead brand	lb.	†.09¾	@ .09⅞
selected	lb.	†.10¼	@ —
"XX red"	lb.	†.09¾	@ .10
French process, green seal	lb.	.15½	@ .16
red seal	lb.	.15	@ .15½
white seal	lb.	.16	@ .16½
Zinc substitutes	ton	25.00	@ —
Zinc sulphide, pure	lb.	.07	@ —

*Nominal.
†Contract prices.

The Crude Rubber Market

NEW YORK, March 20, 1917.

Owing chiefly to the precarious ocean freight situation a firm undertone prevails in the New York market for crude rubber. While the visible supply of rubber is conceded to be ample for current needs, and hardly justifies a buil movement in prices, yet the freight situation, in the opinion of traders, is growing more serious, and is sufficient reason for the bulge in the market.

Other factors which tend to strengthen the views of traders are the international political developments and the disquieting talk of an export duty under consideration by the British authorities. So far, according to best information available, only one steamer has been sunk in the "war zone" carrying rubber from the East, but the possibility of further losses is a sustaining feature. The nonpublication of shipping news tends to becloud the statistical position of rubber, creating a feeling of uncertainty.

In spite of these recent developments manufacturers refused to be stampeded, and their purchasing operations during the past month or so were moderate in volume. Importations since the first of the year have been heavy, which would indicate that contract deliveries are being made without much delay. Manufacturers are said to be well covered ahead. The bulk of the trading in this market has been among dealers, well distributed over the various descriptions.

The London market closed firm on the basis of 38¾d. per lb. for ribbed smoked sheets and first latex pale crepe, respectively, prompt and nearby shipment. Stocks of crude rubber in London on March 1 amounted to 10,592 tons, which compares with 7400 tons on the corresponding date a year ago; 7833 tons in 1915, 4802 tons in 1914, 3652 tons in 1913, and 2141 tons in 1912. Owing to the unusual conditions brought about by the war, these figures form no basis for establishing a market opinion, according to trade authorities.

Importers quote ribbed smoked sheets and first latex pale crepe for spot delivery at 83½ @ 84c per lb. For May-June contracts prices were wholly nominal, but it was reported that some business went through on the basis of 80 @ 80½c per lb. Importers were reluctant to quote on distant figures.

Para up-river fine was inactive but firm at 76½c per lb, spot delivery. On up-river medium 72c was asked, with coarse at 52½c per lb. Rumors to the effect that the British government was to limit the steamship service between Brazil and the United States strengthened the views of sellers. Caucho ball closed at 52½c nominal.

Good interest was shown in Central American descriptions. Stocks on hand are moderate and prices were maintained at 51 @ 52c per lb. for Corinto and 50 @ 51c for Esmeralda. Mexican guayule was scarce and with little moving from primary points; prices were wholly nominal at 47 @ 48c per lb.

Para—Up-river fine	lb	76	@77
Up-river medium		72	@73
Up-river coarse		52½	@53
Islands fine		74½	@75
Islands coarse		35	@35½
Caucho ball, upper		52½	@53
Cameta		37	@38
Madeira fine		79	@80
Ceylons—Smoked sheets, ribbed		84	@84½
Smoked sheets, plain		83	@84
First Latex Pale Crepe		84	@84½
Clean Brown Crepe		79	@80
Centrals—Corinto, prime		51	@52
Esmeralda, prime		50	@51
Nicaragua Scrap		50	@51
Mexican Scrap		50	@51
Balata, Sheets		65	@..
Balata, Block		48	@..
Guayule		47	@49
Africans—Rio Nunez, string		68	@70
Massai, red		69	@71
Benguela		40	@41
East Indian—Pontianak		10¼	@10½
Palembang		10½	@10¾

Scrap Rubber Market

NEW YORK, March 20, 1917.

The scrap rubber market has been characterized by routine dealings, and prices have been well maintained. The following prices are quoted by middlemen to consumers:

Domestic Scrap—			
Boots and shoes, No. 1	per lb.	9	@ 9⅛
Trimmed arties		7⅛	@ 7¼
Bicycle tires		4¾	@ 5
Auto tires		6¾	@ 6⅞
Solid tires		6	@ 6½
No. 1 inner tubes		27½	@28½
No. 2 inner tubes		12¾	@13
Hose		1⅝	@ 2
Red tubes		11⅞	@12
Black rubber		3	@ 4
Foreign Scrap—			
Boots and shoes, No. 1		8½	@ 8¾
Auto tires		6	@ 6¼
White mixed		8	@ 8¼
Red mixed		6⅝	@ 6⅝
Airbrakes		3	@ 4

Rubber from London to the United States

The total value of exports of rubber from London to the United States during the first two months of 1917, amounted to $10,728,067, compared with $7,817,436, during the same period in 1916.

Companies.	1913. *Half kilo.*	1914. *Half kilo.*	1915. *Half kilo.*	1916. *Half kilo.*
Deli-Batavia	.....	99,200	263,500	543,000
Serdang	.....	.....	55,928	114,286
Sumatra	92,603	145,073	233,982	321,517
Preanger	99,020	158,840	229,867	252,400
"Amsterdam"	460,700	883,800	1,759,100	3,026,300

There are numerous other companies which have not yet published reports.

Federated Malay States Tax on Rubber

A law affecting crude rubber and designated as the "War Taxation Enactment, 1916" came into force in the Federated Malay States on Jan. 1, 1917 and will continue until Jan. 1, 1918. It provides that "In addition to the customs duties payable on cultivated rubber, there shall be charged, levied, and paid on all cultivated rubber exported from the Federated Malay States a duty which shall be at the rate of 2½ per cent ad valorem when the price of cultivated rubber does not exceed two shillings-and-sixpence a pound and at a rate of 5 per cent ad valorem when the price of rubber exceeds two shillings-and-sixpence a pound."

The enactment further provides that if the owner or occupier of the land from which the rubber is derived is liable for income tax in the United Kingdom of Great Britain, the rubber shall be exempt from the war tax.

The British rubber plantation companies are said to be highly pleased with this enactment, which they consider an excellent indication of what might be adopted between the members of the British Empire. It certainly illustrates what will in all probability take place when the war is over. It means that owners of property in Malaya, other than British, will not be exempted from the payment of this war export tax. The tax imposed is not heavy, but a preference is given in favor of British companies. Of course, those companies will have to pay income tax upon profits in Great Britain.

Crude Rubber from Straits Settlements

Crude rubber has developed to be the principal item of export from the Straits Settlements to the United States and the American Consul General at Singapore reports that the exports of this commodity during 1916 to the United States were double in both quantity and value those of the year previous. They amounted to 92,332,048 pounds, valued at $51,322,061, against 46,057,597 pounds, valued at $25,043,863 in 1915.

Exports of gutta-percha from the Straits Settlements to the United States in 1916 amounted to 498,246 pounds, valued at $89,825, as compared to 664,133 pounds, worth $82,910 the previous year, showing a material decrease in quantity with a substantial increase in value.

Exports of plantation rubber from Penang during 1916 amounted to $5,645,857.

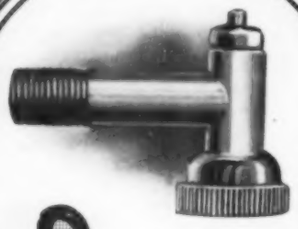
Ceylon's Rubber Exports to United States

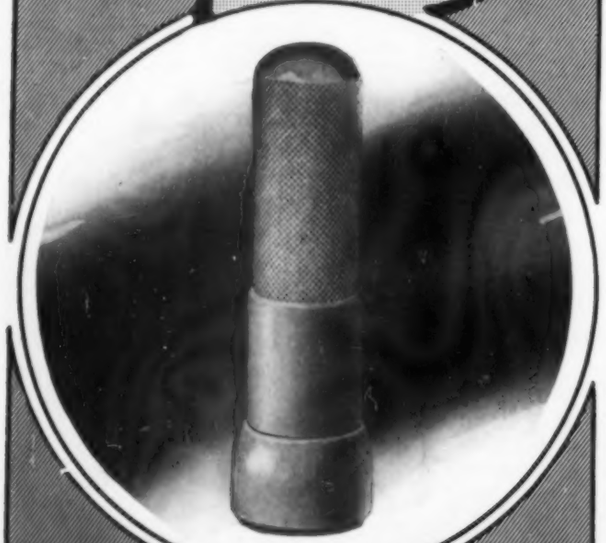
From 20,980,703 pounds valued at $11,449,319 in 1915, Ceylon's exports of crude rubber to the United States increased to 30,473,588 pounds valued at $18,947,782 in 1916.

Production in Netherlands East Indies

Reports published in Amsterdam, Holland, of the production of Dutch rubber companies operating in the Netherlands East Indies show continued development of the industry. The following table give the production of the companies, reports of which have been published in half-kilograms (1.1025 pounds):

Schrader





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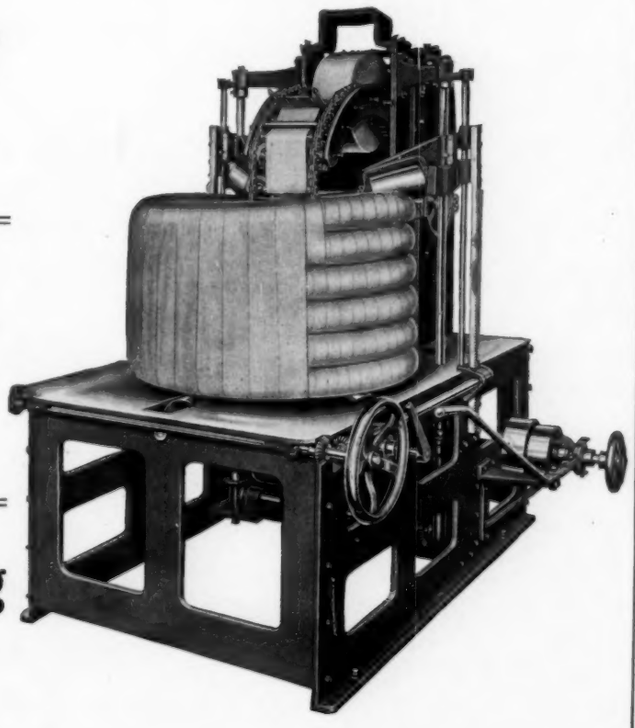

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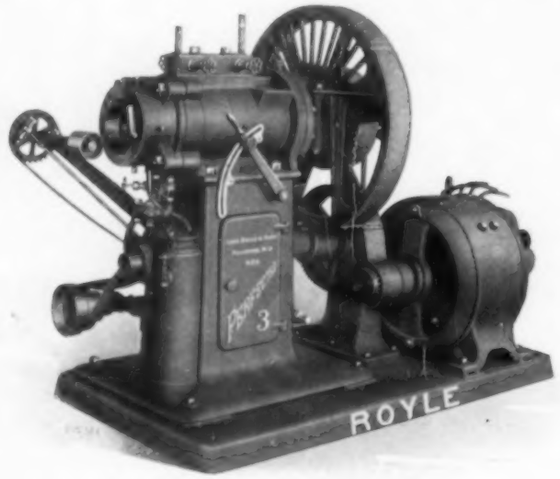

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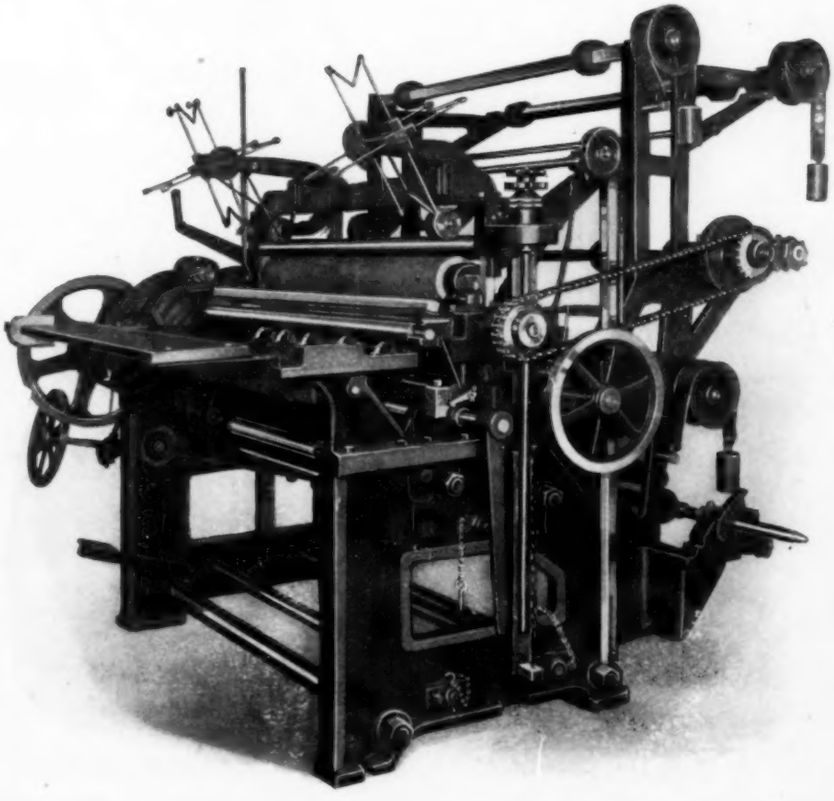

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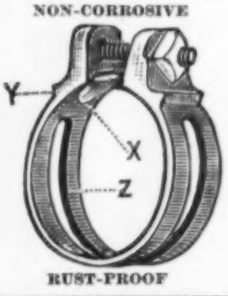

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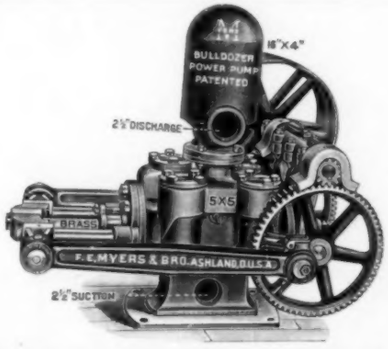

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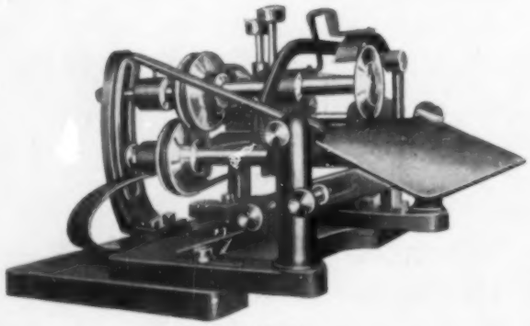

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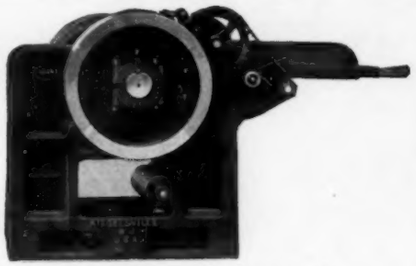

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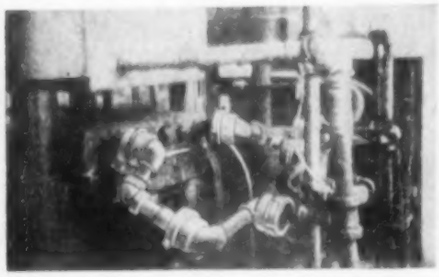

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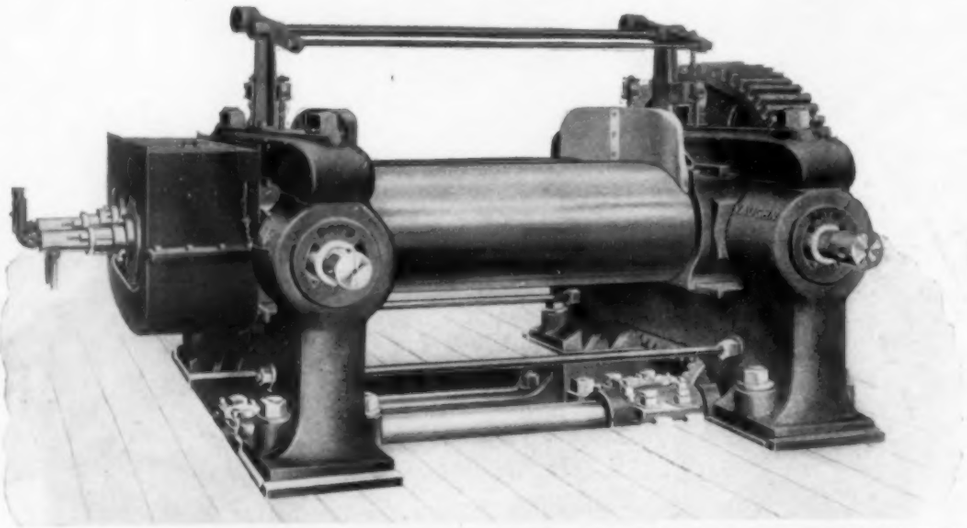

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